

الهيئة السعودية للمواصفات والمقاييس والجودة
Saudi Standards, Metrology and Quality Org (SASO)



SASO 2664: 2017 (Draft)

Refrigerators, Refrigerators with Freezer and freezers –
Energy Performance, Testing and Labeling Requirements

**Refrigerators, Refrigerators with Freezer and freezers –
Energy Performance, Testing and Labeling Requirements**

Saudi Standard No. 2664/2017

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Introduction and Objective

This document has been prepared by the Saudi Standards, Metrology and Quality Organization (SASO) and will supersede the previous standard: 2664:2013" Household Refrigerators, Refrigerator-Freezers and Freezers – Energy performance, testing and labelling requirements". The standard was updated in order to:

- 1- Re-classify the products under the standard scope
- 2- Change the testing methodology (now using IEC standard approved by SASO)
- 3- Clarify the definitions for rated values, tested values and acceptance criteria.
- 4- Update the label design

The objective of this document is to provide detailed performance and energy labelling requirements that refrigerators, refrigerator- freezers and freezers need to meet in order to enter the Saudi market.

1. SCOPE

This standard specifies the Minimum Energy Performance Standard (MEPS) and testing requirements of refrigerators, refrigerator-freezers and freezers.

This standard applies to:

- (a) Refrigerators, refrigerator-freezers, and freezers that are electrically operated on a 60 Hz alternating current, with a nominal supply voltage of 230 V, including built-in appliances
- (b) Refrigerators and refrigerator-freezers with a gross (total) capacity up to 1100 litres (~39 ft³)
- (c) Freezers with a capacity up to 850 litres (~30 ft³)

The requirements in this standard are not applicable to electrically operated refrigerators employing an absorption refrigeration system and for commercial refrigerators, refrigerators-freezers and freezers.

The values in the standard are in SI (metric) units. Any values given in parentheses are for information only.

This Standard shall not apply to:

- (a) Refrigerating appliances primarily powered by energy sources other than electricity, such as liquefied petroleum gas (LPG), kerosene and bio-diesel fuels
- (b) Battery-operated refrigerating appliances that can be connected to the mains through an AC/DC converter
- (c) Refrigerating appliances for tertiary sector application where the removal of refrigerated foodstuffs is electronically sensed and that information can be automatically transmitted through a network connection to a remote control system for accounting
- (d) Appliances where the primary function is not the storage of foodstuffs through refrigeration, such as stand-alone ice- makers or chilled drinks dispenser

2. NORMATIVE REFERENCES

The following normative reference standards apply. However, this standard supersedes the below reference standards in case of conflicting requirements. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- SASO GSO 1899: 2016 "GCC Standard Voltages and Frequencies for Alternating Current Distribution Systems"
- SASO IEC 62552-1 : 2015 "Households refrigerating appliances- Characteristics and test methods – Part 1: scope, definitions, instrumentation, test room and set-up of refrigerating products"
- SASO IEC 62552-2 : 2015 "Households refrigerating appliances- Characteristics and test methods – Part 2 General performance requirements for refrigerating appliances and methods to testing them"
- SASO IEC 62552-3 : 2015 "Households 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 General definitions

3.1.1 Absorption-type refrigerating appliance means a refrigerating appliance in which refrigeration is effected by an absorption process using heat as the energy source.

3.1.2 Compression-type refrigerating appliance means a refrigerating appliance in which refrigeration is effected by means of a motor-driven compressor.

3.1.3 Equivalent refrigerating appliance means a model placed on the market with the same gross and storage volumes, same technical, efficiency and performance characteristics, and same compartment types as another refrigerating appliance model placed on the market under a different commercial code number by the same manufacturer.

3.1.4 Food freezer means a refrigerating appliance with one or more compartments suitable for freezing foodstuffs with temperatures ranging from ambient temperature down to – 18 °C, and which is also suitable for the storage of frozen foodstuffs under three-star storage conditions; a food freezer may also include two-star sections and/or compartments within the compartment or cabinet;

3.1.5 Food stuffs means food, ingredients, beverages and other items primarily intended for consumption that require refrigeration at specified temperatures.

3.1.6 Frozen-food storage cabinet means a refrigerating appliance with one or more compartments suitable for the storage of frozen foodstuffs.

3.1.7 Multi-use appliance means a refrigerating appliance that has no compartment other than one or more multi-use compartments.

3.1.8 Rated value: value or quantity assigned by the manufacturer and marked on the appliance when relevant.

3.1.9 Refrigerating appliance means an insulated cabinet, with one or more compartments, intended for refrigerating or freezing foodstuffs, or for the storage of refrigerated or frozen foodstuffs for non-professional purposes, cooled by one or more energy-consuming processes including appliances sold as building kits to be assembled by the end-user.

3.1.10 Refrigerator means a refrigerating appliance intended for the preservation of foodstuffs with at least one compartment suitable for the storage of fresh food and/or beverages.

3.1.11 Refrigerator-freezer means a refrigerating appliance with at least one fresh-food storage compartment and at least one other compartment suitable for the freezing of fresh food and the storage of frozen foodstuffs under three-star storage conditions (the food-freezer compartment).

3.1.12 Specific beverage storage appliance means a refrigerating appliance that has no compartment other than one or more beverage storage compartments.

3.1.13 Standard rating conditions: Operating conditions of refrigerating appliances for establishing the rated values.

3.14 "Shall"

Shall: Where "shall" or "shall not" are used for a provision specified, that provision is mandatory if compliance with the standard is claimed.

3.2 Technical definitions

3.2.1 Built-in appliance means a fixed refrigerating appliance intended to be installed in a cabinet, in a prepared recess in a wall or similar location, and requiring furniture finishing.

3.2.2 Cellar means a refrigerating appliance where only one or more cellar compartments are present.

3.2.3 Cellar compartment means a compartment intended for the storage of particular foodstuffs or beverages at a temperature warmer than that of a fresh-food storage compartment.

3.2.4 Chest freezer means a food freezer in which the compartment(s) is accessible from the top of the appliance or which has both top-opening type and upright type compartments but where the gross volume of the top-opening type compartment(s) exceeds 75 % of the total gross volume of the appliance.

3.2.5 Chill compartment means a compartment intended specifically for the storage of highly perishable foodstuffs.

3.2.6 Compartment means any of the compartments listed in this list of definitions.

3.2.7 Fast freeze means a reversible feature to be activated by the end-user according to the manufacturer's instructions, which decreases the storage temperature of the freezer or freezer compartment to achieve a faster freezing of unfrozen foodstuffs.

3.2.8 Fresh-food storage compartment means a compartment designed for the storage of unfrozen foodstuffs, which may itself be divided into sub-compartments.

3.2.9 Frozen-food storage compartment means a low-temperature compartment intended specifically for the storage of frozen foodstuffs and classified according to temperature as follows:

- 'one-star compartment': a frozen-food storage compartment in which the temperature is not warmer than $-6\text{ }^{\circ}\text{C}$.
- 'two-star compartment': a frozen-food storage compartment in which the temperature is not warmer than $-12\text{ }^{\circ}\text{C}$.
- 'three-star compartment': a frozen-food storage compartment in which the temperature is not warmer than $-18\text{ }^{\circ}\text{C}$.
- 'food freezer compartment' (or 'four-star compartment'): a compartment suitable for freezing at least 4,5 kg of foodstuffs per 100 l of storage volume, and in no case less than 2 kg, from ambient temperature down to $-18\text{ }^{\circ}\text{C}$ over a period of 24 hours, which is also suitable for the storage of frozen food under three-star storage conditions, and may include two-star sections within the compartment.
- '0-star compartment': a frozen-food storage compartment in which the temperature is $< 0\text{ }^{\circ}\text{C}$ and which can also be used for the freezing and storage of ice but is not intended for the storage of highly perishable foodstuffs.

3.2.10 Frost-free system means a system automatically operated to prevent the permanent formation of frost, where 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.

3.2.11 Frost-free compartment means any compartment defrosted by a frost-free system.

3.2.12 Gross (total) volume means the sum of the volumes of each compartment expressed in litres and rounded to the nearest value.

3.2.13 Ice-making compartment means a low-temperature compartment intended specifically for the freezing and storage of ice.

3.2.14 Multi-use compartment means a compartment intended for use at two or more of the temperatures of the compartment types and capable of being set by the end-user to continuously maintain the operating temperature range applicable to each compartment type according to the manufacturer's instructions; however, where a feature can shift temperatures in a compartment to a different operating temperature range for a period of limited duration only (such as a fast-freeze facility) the compartment is not a 'multi-use compartment' as defined by this standard.

3.2.15 Other compartment means a compartment, other than a special beverage storage compartment, intended for the storage of particular foodstuffs at a temperature warmer than $+14\text{ }^{\circ}\text{C}$.

3.2.16 Other-type refrigerating appliances means a refrigerating appliance in which refrigeration is effected by any other technology or process than compression or absorption-types.

3.2.17 Refrigerator-cellar means a refrigerating appliance where at least one fresh-food storage compartment and one cellar compartment, but no frozen-food storage, chill or ice making compartments, are present.

3.2.18 Refrigerator-chiller means a refrigerating appliance where at least a fresh-food storage compartment and a chill compartment, but no frozen-food storage compartments, are present.

3.2.19 Specific beverage storage compartment means a compartment exclusively designed either for short-term beverage storage to bring beverages to the ideal drinking temperature or for long-term beverage storage, with the following features:

- continuous storage temperature, either pre-set or set manually according to the manufacturer's instructions, in the range from + 5 °C to + 20 °C;
- 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 refrigerating appliances;
- active or passive control of the compartment humidity in the range from 50 % to 80 %;
- constructed to reduce the transmission of vibration to the compartment, whether from the refrigerator compressor or from any external source;

3.2.20 Two-star section means part of a food-freezer, a food-freezer compartment, a three-star compartment or a three-star frozen-food storage cabinet which does not have its own individual access door or lid and in which the temperature is not warmer than – 12 °C.

3.2.21 Top-opening type or chest type means a refrigerating appliance with its compartment(s) accessible from the top of the appliance.

3.2.22 Upright type means a refrigerating appliance with its compartment(s) accessible from the front of the appliance.

4. PRODUCT CATEGORIES

Refrigerating appliances are classified into categories as listed in Table 1.

1	Refrigerator with one or more fresh-food storage compartments
2	Refrigerator-cellar, Cellar and Specific beverage storage appliances
3	Refrigerator-chiller and Refrigerator with a 0-star compartment
4	Refrigerator with a one-star compartment
5	Refrigerator with a two-star compartment
6	Refrigerator with a three-star compartment
7	Refrigerator-freezer
8	Upright freezer
9	Chest freezer
10	Multi-use and other refrigerating appliances

Refrigerating appliances that cannot be classified in categories 1 to 9 because of compartment temperature are classified in category 10.

Refrigerating appliances are also classified into one or more climate classes as shown in Table 2.

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

Each category is defined by the specific compartment composition as specified in Table 3 and is independent of the number of doors and/or drawers.

Nominal temperatures expressed in table 3 apply for determination of the EEI.

Table 3 – Refrigerating appliance classification and relevant compartment composition											
Nominal temperature for EEI (°C)	T	+12	+12	+5	0	0	-6	-12	-18	-18	Category (number)
Compartment type	Other	Special beverages	Cellar	Fresh food storage	Chill	0 star Ice making	1 star	2 star	3 stars	4 stars	
Appliance category											
Refrigerator with one (or more) freshfood compartment	N	N	N	Y	N	N	N	N	N	N	1
Refrigerator-cellar, cellar and specific beverage appliance	O	O	O	Y	N	N	N	N	N	N	2
	O	O	Y	N	N	N	N	N	N	N	
	N	Y	N	N	N	N	N	N	N	N	
Refrigerator chiller and refrigerator with a 0 star compartment	O	O	O	Y	Y	O	N	N	N	N	3
	O	O	O	Y	O	N	N	N	N	N	
Refrigerator with a 1-star compartment	O	O	O	Y	O	O	Y	N	N	N	4
Refrigerator with a 2-star compartment	O	O	O	Y	O	O	O	Y	N	N	5
Refrigerator with a 3-star compartment	O	O	O	Y	O	O	O	O	Y	N	6
Refrigerator-freezer	O	O	O	Y	O	O	O	O	O	Y	7
Upright freezer	N	N	N	N	N	N	N	O ^(*)	Y	Y	8
Chest freezer	N	N	N	N	N	N	N	O	Y	Y	9
Multi-use and other appliances	O	O	O	O	O	O	O	O	O	O	10
Notes: Y means the compartment is present N means the compartment is not present O means the presence of the compartment is optional (*) also includes 3-star frozen-food cabinet											

The refrigerating appliance shall be capable of maintaining the required storage temperatures in the different compartments simultaneously and within the permitted temperature deviations (during the defrost cycle) as defined in Table 4 for the different types of refrigerating appliances and for the appropriate climate classes.

Multi-use appliances and/or compartments shall be capable of maintaining the required storage temperatures of the different compartment types where these temperatures can be set by the end-user according to the manufacturer's instructions.

Table 4 – Storage temperature (°C)

Other compartment	Specific beverage compartment	Cellar compartment	Fresh-food storage compartment	Chill compartment	One-star compartment	Two-star compartment	Food freezer and three star compartment cabinet
t_{om}	t_{wma}	t_{cm}	$t_{1m}, t_{2m}, t_{3m}, t_{ma}$	t_{cc}	t^*	t^{**}	t^{***}
$t_{om} > 14$	$+5 \leq t_{wma} \leq +20$	$+8 \leq t_{cm} \leq +14$	$0 \leq t_{1m}, t_{2m}, t_{3m} \leq +8;$ $+5 \leq t_{ma} \leq +20$	$-2 \leq t_{cc} \leq +3$	$t^* \leq -6$	$t^{**} \leq -12^{(1)}$	$t^{***} \leq -18^{(1)}$

Notes: t_{om} : storage temperature of the other compartment t_{wma} : storage temperature of the special beverage storage compartment with a variation of 0,5 °C t_{cm} : storage temperature of the cellar compartment t_{1m}, t_{2m}, t_{3m} : storage temperatures of the fresh-food compartment t_{ma} : average storage temperature of the fresh-food compartment t_{cc} : instantaneous storage temperature of the chill compartment t^*, t^{**}, t^{***} : maximum temperatures of the frozen-food storage compartments storage temperature for the ice-making compartment and for the '0-star' compartment is below 0 °C⁽¹⁾ for frost-free refrigerating appliances during the defrost cycle, a temperature deviation of no more than 3 °C during a period of 4 hours or 20 % of the duration of the operating cycle, whichever is the shorter, is allowed**5. CRITERIA FOR APPLYING THE MINIMUM ENERGY PERFORMANCE STANDARD (MEPS)****5.1 Declaration of rated values**

The declaration of the rated capacity shall be expressed only in terms of litres (l) according to the following rules:

- The declaration of the rated capacity shall be expressed in litres (l) as multiples of 1 litres
- The declaration of the rated power shall be expressed in terms of watt (W) as multiples of 10 W
- The declaration of the energy efficiency shall be expressed in % as a multiple of 0.1%
- The rated annual energy shall be expressed in kWh as a multiple of 1 kWh

5.2 Determining the Minimum Energy Performance**5.2.1 General**

The Minimum energy performance are based on the Energy Efficiency Index (EEI) which is established from the comparison with a reference appliance.

Details for calculation of the EEI are given in annex B.

5.2.2 Minimum Energy Performance Standard for Refrigerating Appliances

Refrigerating appliances within the scope of this regulation with a storage volume equal to or higher than 10 litres shall comply with the energy efficiency index limits in Table 5.

Table 5 – Minimum Energy Efficiency Index (EEI)

Starting at least 6 months after announcement in the Official Gazette (Um Al-Qura)	EEI < 70
Starting January 1 st , 2020	EEI < 45

5.3 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 6.

Table 6 – Acceptance criteria	
Measured parameter	Verification tolerances
Gross volume	The measured value shall not be less than the rated value by more than 3% or 1 liters, whichever is the greater value
Refrigerating volume	The measured value shall not be less than the rated value by more than 3% or 1 litres, whichever is the greater value. Where the volume of the cellar compartment and fresh food storage compartment are adjustable, relative to one another by the user, this measurement uncertainty applies when the cellar compartment is adjusted to its minimum volume.
Freezing volume	The measured value shall not be less than the rated value by more than 10%
Energy consumption	The measured value shall not be greater than the rated value (E_{24h}) by more than 10%
Specific beverage appliances	The value of the relative humidity shall not exceed the nominal range by more than 10%

6. LABEL AND CLASSIFICATION**6.1 Determining the energy efficiency class**

The energy efficiency class for each product shall be determined as outlined in Table 7, with limit values rounded to two decimals.

6.2 Design and placement of the label¹

The label shall be printed as illustrated in Figure 1. It shall be fixed and non-removable on the most prominent part the product and packaging.

The label must be 100 mm wide and 170 mm high; if the label shall be printed in a larger format its contents must remain proportionate.


¹ The label format and layout are provided for illustrative purposes and the final design and future updates will be available on Saudi Standards, Metrology, and Quality Organization (SASO) registration system.

Table 7 – MINIMUM VALUE OF THE ENERGY EFFICIENCY INDEX			
Bar colour	Energy class		EEI
Dark green	أ	A	EEI < 20
Green	ب	B	20 ≤ EEI < 28
Light green	ج	C	28 ≤ EEI < 35
Yellow	د	D	35 ≤ EEI < 45
Orange	هـ	E	45 ≤ EEI < 55
Red	و	F	55 ≤ EEI < 70
Dark Red	ز	G	EEI ≥ 70

6.3 Information and values contained on the label

- **Field (a):** 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):** Identifies the storage volume the refrigerating part of appliance (in litres and ft³)
- **Field (d):** Identifies the storage volume the freezing part of appliance (in litres and ft³)
- **Field (e):** This field identifies the annual energy consumption of the appliance
- **Field (f):** This field identify the type of appliance (refrigerator or refrigerator-freezer or standalone freezer)
- **Field (g):** This field identifies the general product information including brand name, country of manufacture and model number.
- **Field (h):** This field identifies the registration number, label serial number and the standard reference number
- **Field (i):** QR code representing the main characteristics of the refrigerator, refrigerator-freezer or freezer. The QR code includes information such as:
 - Manufacturer name
 - Model number
 - Country of origin
 - Product category
 - Rated power (W)
 - Rated voltage (V)
 - Rated capacity for food storage as expressed in field d (litres and cubic feet)
 - Rated capacity for storage compartment as expressed in field e (litres and cubic feet)
 - Climate class: SN, N, ST or T (could be one or more classes)
 - Additional information on the maximum ambient temperature
 - Classification (unit-less)
 - Annual energy consumption (AE_C) in kWh
- **Field (j):** This field identifies the legal statement.


Figure 1 – Energy efficiency sample label



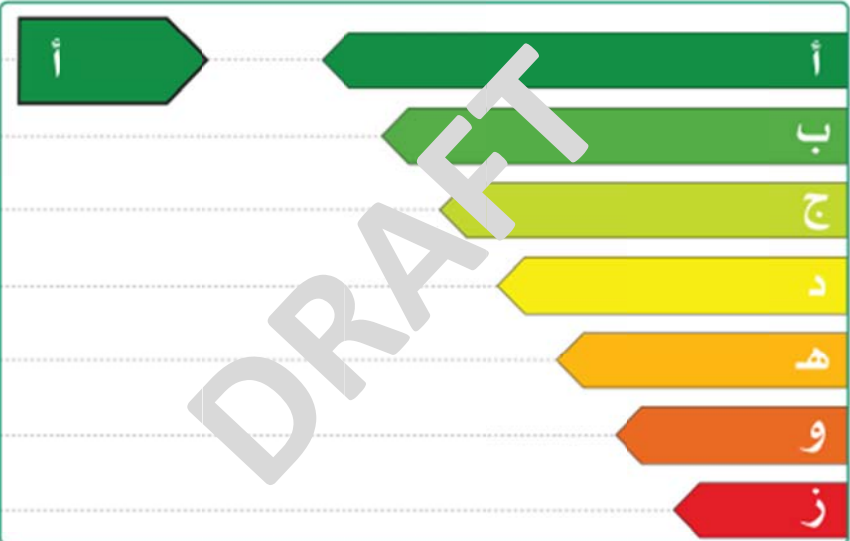
الهيئة السعودية للمواصفات والمقاييس والجودة
Saudi Standards, Metrology and Quality Org.

بطاقة كفاءة الطاقة

ENERGY EFFICIENCY LABEL




REFRIGERATOR | ثلاجة




DRAFT

الإستهلاك السنوي للطاقة
ANNUAL ENERGY CONSUMPTION



kWh كيلو واط ساعة


سعة المجمد
CAPACITY OF FREEZER



LITERS لتر

(مجمد) (قدم مكعب)

سعة الثلاجة
CAPACITY OF REFRIGERATOR




LITERS لتر

(مجمد) (قدم مكعب)

TYPE: **مجمد** FREEZER **ثلاجة و مجمد** REFRIGERATOR / FREEZER **ثلاجة** REFRIGERATOR النوع

MADE IN بلد الصنع

BRAND NAME العلامة التجارية



MODEL NUMBER رقم الطراز

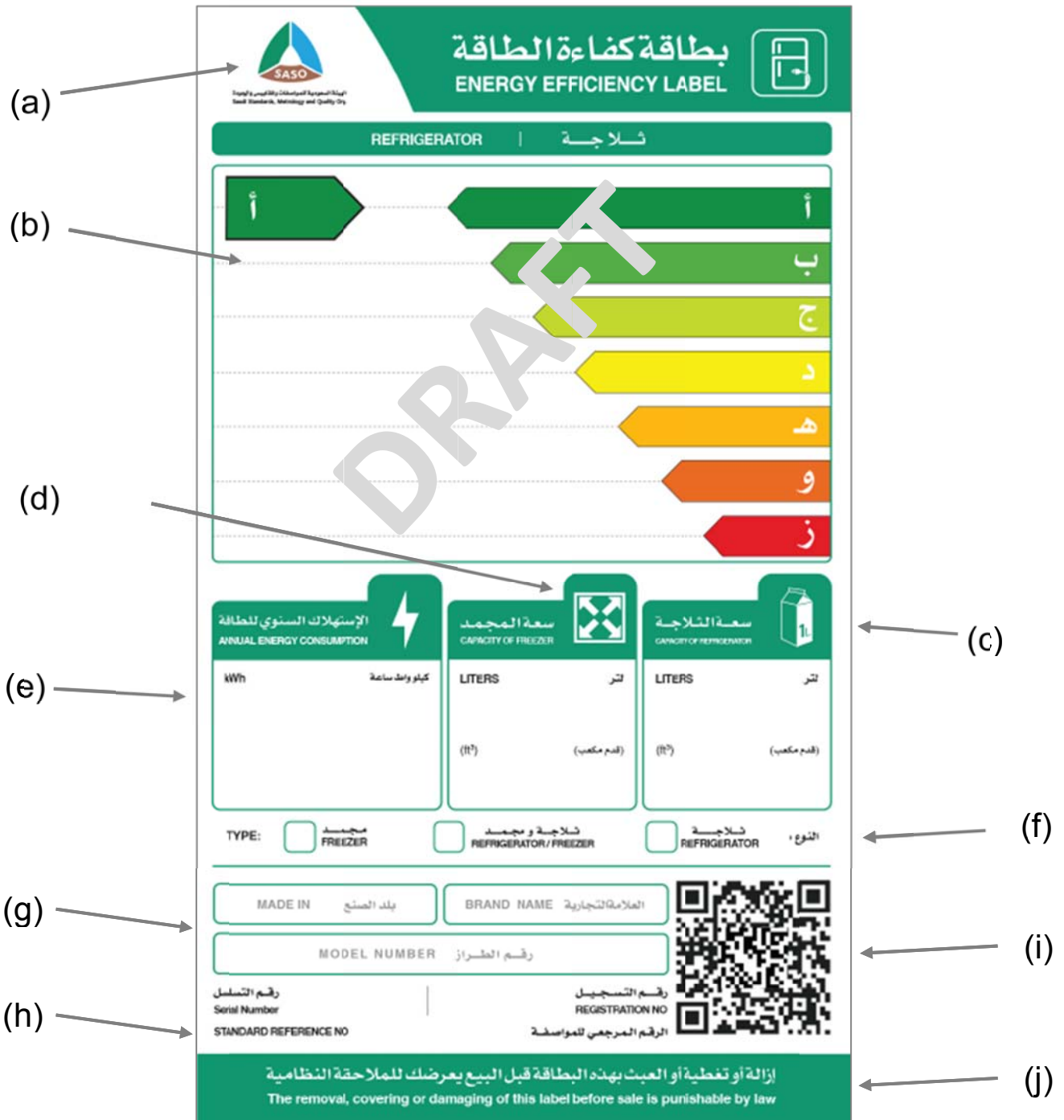
رقم التسجيل
REGISTRATION NO

رقم التمسيل
Serial Number

الرقم المرجعي للمواصفة
STANDARD REFERENCE NO

إزالة أو تغطية أو العبث بهذه البطاقة قبل البيع يعرضك للملاحقة النظامية
The removal, covering or damaging of this label before sale is punishable by law

Figure 2 – Position of information on the label



7. MARKING AND INSTRUCTIONS

7.1 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.

7.2 Nameplate information

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

- Manufacturer name
- Model number
- Country of origin
- Product category
- Rated power (W)
- Rated voltage (V)
- Rated capacity for food storage as expressed in field d (litres and cubic feet)
- Rated capacity for storage compartment as expressed in field e (litres and cubic feet)
- Climate class: SN, N, ST or T (could be one or more classes)
 - Additional information on the maximum ambient temperature (not mandatory)
- Classification (unit-less)
- Annual energy consumption (AEC) in kWh

7.3 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 instruction sheet or manual 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) Supplier's name or trade mark
- b) Supplier's model identifier
- c) Category of the refrigerating appliance model in accordance with Table 1
- d) Energy efficiency class of the model in accordance with Table 7
- e) Annual energy consumption (AEC) in kWh per year, rounded up to the nearest integer and calculated in accordance with Annex B. It shall be described as: 'Energy consumption "XYZ" kWh per year, based on standard test results for 24 hours. Actual energy consumption will depend on how the appliance is used and where it is located'
- f) Storage volume of each compartment and applicable star rating in accordance with Table 3, if any
- g) The design temperature of 'other compartments' within the meaning of Table 3. For special beverage storage compartments, the coldest storage temperature, either pre-set in the compartment or capable of being set by an end-user and capable of being maintained continuously according to the manufacturer's instructions, shall be given
- h) The mention 'frost-free' for the relevant compartment(s), as defined in Table 3
- i) 'Power cut safe "X" h' defined as 'temperature rise time'
- j) 'Freezing capacity' in kg/24 h

- k) 'Climate class' in accordance with Clause 4 Table 2, and expressed as: 'Climate class: W [climate class]. This appliance is intended to be used at an ambient temperature between "X" [lowest temperature] °C and "X" [highest temperature] °C'
- l) If the model is intended to be a built-in appliance, an indication to this effect

The information contained in the instruction sheet or manual may be given in the form of a copy of the label, either in colour. Where this is the case, the information listed in point 1.1 not already displayed on the label shall also be provided.

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

8. REGISTRATION REQUIREMENTS

Product registration is mandatory, whereby information about registration requirements will 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.

For registration, a test report covering the product submitted shall be attached. The test report shall be issued from an entity (laboratory) certified through ILAC procedure or approved by SASO.

Applications shall be submitted through the registration system electronically via SASO website. The applicant shall fulfill all updated requirements of the electronic registration system and any new requirements, procedures, and regulations required by SASO. A draft of the registration form has been provided below (the final version is the one present on the SASO website).

Labels are published by the registration application system after the final registration of a product.

ANNEX A – Application for registration or renewal of registration of refrigerators, refrigerators-freezers and freezers for energy efficiency (informative)

I hereby apply for the registration of a refrigerator, refrigerator- freezer or freezer (s) for the purpose of energy efficiency.

In the country of
(specify the country in which this application is made)

SECTION (1) – APPLICANT DETAILS

Name of applicant
Business address
P.O Box
Post code
Contact person
Position/title
Tel (.....).....
Fax (.....).....
Email

SECTION (2) – DESCRIPTION OF THE PRODUCT

Name of manufacturer
 Brand name
 Model number
 Country of origin / Made in
XXXXX
 Model year
 Gross Volume (l)
 Refrigerator volume (l)
 Freezer volume (l)
 Power (W)
 Voltage (V)
 Rated annual energy (kWh)
 Climate Class (es)
 Frost free (Y/N)
 Built-in (Y/N)
 Compartment 3 - Type
 Compartment 3 – Volume
 .../...

If registered products issuing different commercial names or designation , please specify below the list of all the brand names, model numbers, and registration numbers of products in the same family

Brand name	Model number	Registration number	Tested product?
			Yes/No
			Yes/No
			Yes/No

SECTION (3) – TESTING AND TEST REPORT

Name of laboratory
Test date
Tested unit brand name
Tested unit model number
Type of test Physical testing (at SASO approved laboratory)
Testing method SASO IEC 62552
 Other (specify e.g EN IEC 62552).....

Note: test can be done in the manufacturer’s laboratory only if the laboratory is recognised by a SASO notified body to operate according to ISO 17025 – see Clause 8)

Testing results:

Power (W)
Voltage (V)
Gross Volume (l)
Refrigerator volume (l) –
Compartment 1
Freezer volume (l) –
compartment 2
Compartment 3 -Type
Volume of Compartment 3 (l)
Tested energy
Tested temperature
(compartment 1)
Test temperature
Compartment 2
Energy E24

ANNEX B – Calculation of the energy efficiency index (EEI)**B.1 General Principles**

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:

$$EEI = 100 \times \frac{AE_C}{SAE_C} \quad \text{Eq. (B1)}$$

Where:

- AE_C = Annual Energy Consumption of the refrigerating appliance
- SAE_C = Standard Annual Energy Consumption of the refrigerating appliance.

B.2 Determination of the Annual Energy Consumption AE_C

The Annual Energy Consumption (AEC) is calculated in kWh/year and rounded to two decimal places, as:

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

$$AE_C = 365 \times E_{24h} \quad \text{Eq. (B2)}$$

Where

- E_{24h} is the energy consumption of the refrigerating appliance in kWh/24h and rounded to three decimal places.

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

The Standard Annual Energy Consumption (SAE_C) is calculated in kWh/year and rounded to two decimal places, as:

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

$$SAE_C = V_{eq} \times M + N + CH \quad \text{Eq. (B3)}$$

Where:

- V_{eq} is the equivalent volume of the refrigerating appliance
- CH is equal to 50 kWh/year for refrigerating appliances with a chill compartment with a storage volume of at least 15 litres; otherwise, CH is equal to 0 kWh/year.
- The M and N values are given in Table B3 for each refrigerating appliance category.

B.4 Calculation of the Volume equivalent used for the calculation of the Standard Annual Energy Consumption SAE_c

The equivalent volume of a refrigerating appliance is the sum of the equivalent volumes of all compartments. It is calculated in litres and rounded to the nearest integer as:

$$V_{eq} = \left[\sum_{c=1}^{c=n} V_c \times \frac{(25 - T_c)}{20} \times FF_c \right] \times CC \times BI \quad \text{Eq. (B4)}$$

Where:

- n is the number of compartments
- V_c is the storage volume of the compartment(s)
- T_c is the nominal temperature of the compartment(s) as set out in Table 3
- $\frac{(25-T_c)}{20}$ is the thermodynamic factor as set in Table B1
- FF_c , CC and BI are volume correction factors as set out in Table B2

The thermodynamic correction factor $\frac{(25-T_c)}{20}$ is the temperature difference between the nominal temperature of a compartment T_c (defined in Table 2) and the ambient temperature under standard test conditions at + 25 °C, expressed as a ratio of the same difference for a fresh-food compartment at + 5 °C.

The thermodynamic factors for the compartments are set out in Table B1.

Table B1 – Thermodynamic factor for refrigerating appliance compartment		
Type of compartment	Nominal temperature	$\frac{(25 - T_c)}{20}$
Cellar compartment, specific beverage compartment	+ 12 °C	0.65
Fresh-food storage compartment	+ 5 °C	1.00
Chill compartment	0 °C	1.25
Ice-making compartment and 0-star compartment	0 °C	1.25
One-star compartment	-6 °C	1.55
Two-star compartment	-12 °C	1.85
Three-star compartment	-18 °C	2.15
Food freezer compartment (four-star compartment)	-18 °C	2.15
Other compartments	Design temperature	$\frac{(25 - T_c)}{20}$

Notes:

(i) for multi-use compartments, the thermodynamic factor is determined by the nominal temperature as given in Table 2 of the coldest compartment type capable of being set by the end-user and maintained continuously according to the manufacturer's instructions;

(ii) for any two-star section (within a freezer) the thermodynamic factor is determined at $T_c = -12$ °C;

(iii) for other compartments the thermodynamic factor is determined by the coldest design temperature capable of being set by the end-user and maintained continuously according to the manufacturer's instructions.

Table B2 – Value of correction factors FF, CC and BI		
Correction factor	Value	Conditions
FF (frost-free)	1.2	For frost-free frozen-food compartment
	1.0	Otherwise
CC (climate class)	1.2	For T class (tropical) appliances
	1.1	For ST (subtropical) appliances
	1.0	Otherwise
BI (built-in)	1.2	For built-in appliances under 58cm in width
	1.0	Otherwise

Notes:

(i) FF is the volume correction factor for frost-free compartments.

(ii) CC is the volume correction factor for a given climate class. If a refrigerating appliance is classified in more than one climate class, the climate class with the highest correction factor is used for the calculation of the equivalent volume.

(iii) BI is the volume correction factor for built-in appliances

B.5 Determination of the M and N coefficient used for calculation of the Standard Annual Energy Consumption SAE_c

The coefficient M and N are determined based upon the category of refrigerating appliance according with Table B3

Table B3 – M and N values by refrigerating appliance category		
Category	M	N
1	0.233	245
2	0.233	245
3	0.233	245
4	0.643	191
5	0.450	245
6	0.777	303
7	0.777	303
8	0.539	315
9	0.472	286
10	(*)	(*)

(*) for Category 10 refrigerating appliances the M and N values depend on the temperature and star rating of the compartment with the lowest storage temperature capable of being set by the end-user and maintained continuously according to the manufacturer's instructions. When only an 'other compartment' as defined in Table 3 is present, the M and N values for Category 1 are used. Appliances with three-star compartments or food-freezer compartments are considered to be refrigerator-freezers