مشروع نهائي
مواصفة قياسية عمانية

الثلجات والثلجات مع مجمد والمجمدات – متطلبات أداء الطاقة و الاختبار والبطاقات

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

المديرية العامة للمواصفات والمعايير
وزارة التجارة والصناعة

هذه الوثيقة مشروع لمواصفة قياسية عمانية تم توزيعها لإبداء الرأي والملاحظات بشأنها، لذلك فإنها عرضة للتغيير والتبديل، ولايجوز الرجوع إليها كمواصفة قياسية عمانية معتمدة إلا بعد اعتمادها.
التقديم

المديرية العامة للمواصفات والمقاييس جهاز التقييس الوطني بالسلطنة أنشئت بموجب المرسوم السلطاني رقم 39/1976، ومن مهامها إعداد المواصفات الفنية العمانية واللوائح الفنية استنادا للمرسوم السلطاني رقم 87/1.

وقد قامت دائرة المواصفات بالمديرية بإعداد هذه المواصفة الفنية العمانية " الثلاجات والثلاجات مع مجمد والمجمدات - متطلبات أداء الطاقة والاختبار والبطاقات " وقد تم إعداد المشروع باللغة الإنجليزية استنادا على المواصفة الفنية السعودية Energy – SASO 2892/2018 (Refrigerators, Refrigerator- Freezers and Freezers - Energy Performance, Testing And Labeling Requirements)

واستعراض المواصفات القياسية الدولية والأجنبية والمؤلفات المراجعه.

وقد اعتمدت هذه المواصفة كمواصفة قياسية عمانية ملزمة، بتاريخ / / ه، الموافق / / م.

Forward

General Directorate of Standardization and Metrology (DGSM) is the National standard body in Sultanate of Oman. It was established according to Royal Decree No. 39/1976. DGSM is responsible of issuing Omani standards and technical regulations.

Director of standards, in the DGSM has prepared this standard “Refrigerators, Refrigerator- Freezers and Freezers - Energy Performance, Testing and Labeling Requirements”. The draft standard has been prepared in English language based on SASO 2892/2018 (Refrigerators, Refrigerator- Freezers and Freezers - Energy Performance, Testing And Labeling Requirements) , and relevant international and National foreign standard and references,

This standards was approved as an Omani Technical Regulation on / / H, / /
Refrigerators, Refrigerator-Freezers and Freezers -
Energy Performance, Testing and Labeling Requirements

1. SCOPE

This standard specifies the Minimum Energy Performance Standard (MEPS), energy efficiency labelling and testing requirements of electric powered refrigerators, refrigerator-freezers and freezers being manufactured, imported and sold in Oman.

This standard applies to:

(a) Refrigerators, refrigerator-freezers, and freezers that are electrically operated on a 50 Hz alternating current, with a nominal supply voltage of 240 V, including built-in appliances

(b) Refrigerators and refrigerator-freezers with a capacity up to 1500 liters (53 ft³)

(c) Freezers with a capacity up to 850 liters (30 ft³)

The requirements in this standard are not applicable to refrigerators employing an absorption refrigeration system and for commercial refrigerators, refrigerator-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, purchased separately

(c) Custom-made refrigerating appliances, made on a one-off basis and not equivalent to other refrigerating appliance models

(d) 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

(e) 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.

- GSO 1899: 2016 "GCC Standard Voltages and Frequencies for Alternating Current Distribution Systems"
- IEC 62552 -1:2015
- IEC 62552 -2:2015
- IEC 62552 -3:2015

In case of update of the IEC standards mentioned as adoption hereinabove, the updated version shall be effective after 2 years of the last international update.

If the adopted IEC standard is withdrawn, then the updated version / replacing standard shall be effective immediately.

3 Terms, definitions and symbols

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

3.1 General terms and definitions

3.1.1 refrigerating appliance
insulated cabinet with one or more compartments that are controlled at specific temperatures and are of suitable size and equipped for household use, cooled by natural convection or a forced convection system whereby the cooling is obtained by one or more energy-consuming means

Note 1 to entry: From the point of view of installation, there are various types of household refrigerating appliances (free-standing, portable, wall-mounted, built-in, etc.).

3.1.2 refrigerator
refrigerating appliance intended for the storage of foodstuff, with at least one fresh food compartment

3.1.3 refrigerator-freezer
refrigerating appliance having at least one fresh food compartment and at least one freezer compartment

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

3.1.5 freezer
refrigerating appliance with only frozen compartments, at least one of which is a freezer
3.1.6 Special beverages storage appliance: refrigerating appliance that has no compartment other than one or more special beverages compartments.

Note 1 to entry: An appliance containing any compartments which do not fulfil all requirements as specified for special beverages compartments under Annex G cannot be categorised as a special beverages storage.

3.1.7 Built-in appliance
Refrigerating appliance intended to be used whilst fastened in an enclosure or secured in a prepared recess in a wall or similar location.

3.1.8 Foodstuff
Food and beverages intended for consumption.

3.1.9 Rated value declared by the manufacturer (e.g. volume, energy consumption, usage).

3.1.10 Normal use
Operation when the refrigerating appliance is subjected to a range of different conditions that could occur during use including operation in a range of:

- indoor temperatures (including those defined in the Storage Test, see Clause 6 of IEC 62552-2:2015),
- different humidity levels and
- user-related actions, such as door openings (which may be regular, infrequent or a mixture thereof) and the addition and removal of foodstuff or other stored items.

3.2 Terms and definitions related to refrigerating system

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

3.2.2 Condenser
Heat exchanger from which heat in the refrigerant is rejected to an external cooling medium (usually the air surrounding the appliance).

3.2.3 Evaporator
Heat exchanger which absorbs heat from the compartment to be refrigerated and transfers this to the refrigerant.

3.3 Compartments and sections

3.3.1 Compartment
enclosed space within a refrigerating appliance, which is directly accessible through one or more external doors, which may itself be divided into sub-compartments

Note 1 to entry: The requirements for the following compartment types are specified in Table 2 of IEC 62552-2:2015 and Table 1 of IEC 62552-3:2015

Note 2 to entry: Throughout this standard, unless specified otherwise, “compartment” shall be taken to mean compartment and/or sub-compartment as appropriate for the context.

3.3.2 sub-compartment
permanent enclosed space within a compartment which has a different operating temperature range from the compartment within which it is located

3.3.3 convenience feature
enclosure, or a container (either fixed or removable by the user), in which suitable storage conditions are provided for designated types of foodstuff

Note 1 to entry: These conditions may be different from those of the compartment in which it is located.

3.3.4 variable temperature compartment
compartment intended for use as two (or more) alternative compartment types (e.g. 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 compartment type claimed

Note 1 to entry: A compartment intended for use as a single type but that can also meet additional types (e.g. a chill compartment that may also fulfil zero-star requirements) is not a variable temperature compartment.

3.3.5 freezer compartment
compartment that meets three-star or four-star requirements

Note 1 to entry: In certain instances, two-star sections and/or sub-compartments are permitted within the compartment.

3.3.6 fresh food compartment
compartment for the storage and preservation of unfrozen foodstuff

3.3.7 cellar compartment
compartment for the storage of foodstuff at a temperature that is warmer than that of a fresh food compartment

3.3.8 pantry compartment
compartment for the storage of foodstuff at a temperature that is warmer than that of a cellar compartment

3.3.9 chill compartment
compartment for the storage of highly perishable foodstuff

3.3.10 ice-making compartment
compartment specifically for the making and storage of ice
Note 1 to entry: an ice-making compartment is classified as a zero-star compartment or a frozen compartment.

3.3.11
ice mould
form in an automated icemaker which is automatically filled with water and from which the ice cubes are automatically ejected

3.3.12
ice cube tray
removable tray which is manually filled with water and from which ice cubes are manually ejected

Note 1 to entry: Ice cube trays with water are used as load in order to determine load processing efficiency. See Annex G of IEC 62552-3:2015.

3.3.13
zero-star compartment
compartment in which the temperature is not warmer than 0 °C that can be used for the making and storage of ice but is not suitable for the preservation of highly perishable foodstuff

3.3.14
Specific beverage compartment
compartment specifically for the storage and maturation of certain beverages

3.3.15
unfrozen compartment
any of the following compartment types: zero-star, chill, fresh food, cellar, wine storage or pantry

Note 1 to entry: although ice-making compartments and zero star compartments operate below zero, they are configured as unfrozen compartments for energy and performance tests in this standard.

3.3.16
frozen compartment
any of the following compartment types: one-star, two-star, three-star, four-star

Note 1 to entry: frozen compartments are classified according to temperature, see 3.3.16.1 to 3.3.16.4.

3.3.16.1
one-star
compartment where the storage temperature is not warmer than –6 °C

3.3.16.2
two-star
compartment where the storage temperature is not warmer than –12 °C

3.3.16.3
three-star
compartment where the storage temperature is not warmer than –18 °C

3.3.16.4
four-star
compartment where the storage temperature meets three-star conditions and where the minimum freezing capacity meets the requirements of Clause 8 of IEC 62552-2:2015

Note 1 to entry: In certain instances, two-star sections and/or sub-compartments are permitted within a four-star compartment.

3.3.17
two-star section
part of a **three-star** or **four-star compartment**, which is not self-contained (i.e., does not have its own individual access door or lid) and which meets **two-star** requirements

Note 1 to entry: Any **two-star** section in the **compartment** shall not exceed 20 % of the total **compartment volume**.

### 3.3.18 vegetable drawer or crisper convenience feature
provided primarily to retard dehydration of fruits and vegetables

Note 1 to entry: A **vegetable drawer** is usually considered as a removable **convenience feature** but is normally left in situ for testing purposes.

### 3.4 Physical aspects and dimensions

#### 3.4.1 top-opening type refrigerating appliance
in which the **compartment**(s) are accessible from the top (usually via a lid)

#### 3.4.2 upright type refrigerating appliance
in which the **compartment**(s) are accessible from the front

#### 3.4.3 overall dimensions
space taken up by the **refrigerating appliance** (height, width and depth) with doors or lids closed

#### 3.4.4 space required in use
space taken up by the **refrigerating appliance** (height, width and depth) necessary for **normal use** with doors or lids closed, including space necessary for air circulation and any handles.

#### 3.4.5 overall space required in use
total space taken up by the **refrigerating appliance** (height, width and depth) necessary for **normal use** with doors or lids open.

#### 3.4.6 volume
space within the inside liner of the **refrigerating appliance**, or a **compartment** or **sub compartment** as determined in IEC 62552-3:2015

#### 3.4.7 shelf
horizontal surface on which **foodstuff** can be placed

Note 1 to entry: A **shelf** can be formed by one component or by components fitted side by side, which can be fixed or removable.

#### 3.4.8 load limit
surface enveloping a storage space and intended for the storage of **foodstuff** or other items

Note 1 to entry: A **load limit** may be a natural obvious feature or a marked line.

#### 3.4.9 storage plan
arrangement of test packages within a **refrigerating appliance** when testing specific aspects of performance in accordance with this standard
3.5 Terms and definitions relating to performance characteristics

3.5.1 energy consumption
energy used by a refrigerating appliance over a specified period of time or for a specified operation as determined in accordance with IEC 62552-3:2015 stated in kWh (kilowatt hour)

3.5.2 average power consumption
average rate of energy consumption of a refrigerating appliance for a specific test condition or operation as determined in accordance with IEC 62552-3:2015 measured in watt (W)

3.5.3 storage temperature
temperature which the refrigerating appliance is capable of maintaining in accordance with 6.5 of IEC 62552-2:2015

3.5.4 target temperature
reference compartment temperature which is used for determining energy and average power consumption attributes in IEC 62552-3:2015

Note 1 to entry: Target temperatures are air temperatures.
3.5.5
Defrosting
3.5.5.1
automatic defrost
defrosting where no action is necessary by the user 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

3.5.5.2
manual defrost
defrost that is not an automatic defrost

3.5.5.3
cyclic defrost
automatic defrost system where the refrigerated surfaces which cool a compartment (usually an unfrozen compartment) in an appliance are automatically defrosted and defrosting occurs during each cycle of the refrigeration system

Note 1 to entry: Cyclic defrost systems do not have a defrost control cycle.

3.5.5.4
variable defrost
automatic defrost system designed to minimise energy consumption which adjusts the time intervals between successive defrosts under normal use to better match the actual frost load on the evaporator by the assessment of an operating condition (or conditions) other than, or in addition to, elapsed time or compressor run time

Note 1 to entry: Demand defrost, (directly measuring the frost on the evaporator and defrosting accordingly) is a form of variable defrost.

3.5.6
stable operating conditions
conditions in which a refrigerating appliance mean temperatures and energy consumption comply with the relevant stability requirements as defined in IEC 62552-2 or IEC 62552-3 as applicable

3.5.7
steady state
stable operating conditions that meet the criteria as specified in Annex B of IEC 62552-3:2015

3.5.8
ambient temperature
measured temperature in the space surrounding the refrigerating appliance under test

Note 1 to entry: The ambient temperature for each test type is measured as specified in Annex A of this Part and its value is as specified in IEC 62552-2:2015 and IEC 62552-3:2015 of this standard as applicable for the particular test.

3.5.9
control event
change in operating conditions

Note 1 to entry: Control events include but are not limited to—
a) starts, stops or speed changes of compressors;
b) changes of baffle position, fan operation, or other modulating control or device;
c) changes in operation of the refrigerant circuit;
d) defrost heater on and off;
e) icemaker operation.

3.5.10
frost-free
automatic defrost system to prevent the permanent formation of frost on a remote evaporator or evaporators
3.5.11
**temperature control**
device that is intended to automatically regulate the temperature within one or more compartments

Note 1 to entry: Unless otherwise stated, a two position (e.g. open or closed) control is not included within the meaning of a temperature control.

3.5.12
**user-adjustable temperature control**
temperature control intended for adjustment by the user to vary the temperature within one or more compartments within a refrigerating appliance

3.5.13
**temperature control setting**
setting of a user-adjustable temperature control selected for the measurement of energy or performance in accordance with this standard

3.5.14
**cooling time**
time taken for a specified load in a fresh food compartment to be cooled as defined in Clause 7 of IEC 62552-2:2015

3.5.15
**cooling capacity**
rate at which a specified load in a fresh food compartment can be cooled as defined in Clause 7 of IEC 62552-2:2015

3.5.16
**freezing time**
time to freeze in a freezer or freezer compartment a set amount of load as defined in Clause 8 of IEC 62552-2:2015

3.5.17
**freezing capacity**
rate of heat extraction by the refrigeration system from a load in a freezer or freezer compartment as defined in Clause 8 of IEC 62552-2:2015

3.5.18
**ice-making capacity**
quantity of ice the refrigerating appliance is capable of producing in an automatic icemaker in accordance with Clause 9 of IEC 62552-2:2015

3.5.19
**temperature rise time**
time taken, after the operation of the refrigerated system has been interrupted, for the temperature to increase a defined amount when tested as specified in Annex C of IEC 62552-2:2015

3.5.20
**ballast load**
combination of test and M-packages already at storage temperature and in the freezer or freezer compartment when the light load is added during the freezing capacity test
3.5.21
light load
combination of test and M-packages at ambient temperature that are loaded into a freezer compartment during the freezing capacity test

3.5.22
processing load efficiency test
test in which a specified water load is introduced to the appliance to determine how much extra energy is needed to cool it down (and, in frozen compartments, freeze it)

Note 1 to entry: See Annex G of IEC 62552-3:2015.

3.5.23
processing load
energy equivalent of a user processing load in Wh/day

3.5.24
load processing efficiency
ratio of additional energy used by the refrigerating appliance to cool a specified processing load to the calculated heat energy removed from that processing load

3.5.25
processing load recovery period
time taken to reach stable operating conditions after introduction of the specified load for the processing load efficiency test

3.6.1
temperature control cycle
definite repetitive swings in temperature caused by operation of a temperature control device (on/off or otherwise)

Note 1 to entry: The period of a temperature control cycle is the time between a control event and its repetition on the next cycle. Where the control events cannot be discerned, the period of a temperature control cycle is the time between two successive temperature warmest points or two successive temperature coldest points.

3.6.2
defrost control cycle
period commencing at the end of stable operating conditions prior to the initiation of an automatic defrost and terminating at a like point prior to the next automatic defrost

Note 1 to entry: The commencement and finish points of the defrost control cycle prior to automatic defrosting shall be:

a) for a refrigerating system with on/off cycles, the period commencing at the end of the last regular temperature control cycle (for example the end of last off period);

b) for a refrigerating system without on/off cycles but with regular temperature cycles, at the last power/speed/cooling change that relates to a regular temperature maximum; and

c) for a refrigerating system without on/off cycles and without regular temperature cycles, at the end of stable temperature operation.

Note 2 to entry: Cyclic defrost systems do not have a defrost control cycle.

3.6.3
defrosting operation
period from the initiation of a defrost control cycle until the initiation of the refrigeration system cooling after defrosting
3.6.4
**defrost and recovery period**
period from the initiation of a *defrost control cycle* until *stable operating conditions* are established

Note 1 to entry: For products that do not reach *stable operating conditions* (for example that have a temperature that is continually decreasing after a *defrosting operation*), the *defrost and recovery period* could be equal to the *defrost control cycle*.

3.6.5
**recovery period**
period from the end of the *defrosting operation* until the end of the *defrost and recovery period*

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**Figure 1** Illustration of selected definitions

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4. PRODUCT CATEGORIES

Refrigerating appliances are also classified into one or more climate classes as shown in Table 1.

† Source: IEC 62552:2015
Table 1 Climate class

<table>
<thead>
<tr>
<th>Class</th>
<th>Symbol</th>
<th>Ambient average temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extended temperate</td>
<td>SN</td>
<td>+10 to +32</td>
</tr>
<tr>
<td>Temperate</td>
<td>N</td>
<td>+16 to +32</td>
</tr>
<tr>
<td>Subtropical</td>
<td>ST</td>
<td>+16 to +38</td>
</tr>
<tr>
<td>Tropical</td>
<td>T</td>
<td>+16 to +43</td>
</tr>
</tbody>
</table>

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 2 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 2 Storage conditions and target temperature per compartment type

<table>
<thead>
<tr>
<th>Compartment type</th>
<th>Name of compartment</th>
<th>Storage condition $T_{\text{min}}$ °C</th>
<th>Target temperature $T_c$ °C</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfrozen</td>
<td>Pantry</td>
<td>+14</td>
<td>+17</td>
<td>$T_{\text{min}}$ &amp; $T_{\text{max}}$ are the average values measured over the test period (average over time and over a set of sensors).</td>
</tr>
<tr>
<td></td>
<td>Specific Beverage</td>
<td>+5</td>
<td>+12</td>
<td>• 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.</td>
</tr>
<tr>
<td></td>
<td>Cellar</td>
<td>+2</td>
<td>+14</td>
<td>$T_{\text{min}}$ &amp; $T_{\text{max}}$ are the average values measured over the test period (average over time for each sensor) and define the maximum allowed temperature operating range</td>
</tr>
<tr>
<td></td>
<td>Fresh food</td>
<td>0</td>
<td>+4</td>
<td>$T_{\text{min}}$ &amp; $T_{\text{max}}$ are the average values measured over the test period (average over time and over a set of sensors).</td>
</tr>
<tr>
<td></td>
<td>Chill</td>
<td>-3</td>
<td>+2</td>
<td>$T_{\text{min}}$ &amp; $T_{\text{max}}$ are instantaneous values during the test period.</td>
</tr>
<tr>
<td>Compartment type</td>
<td>Name of compartment</td>
<td>Storage condition</td>
<td>Target temperature</td>
<td>Note</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------</td>
<td>-------------------</td>
<td>--------------------</td>
<td>------</td>
</tr>
<tr>
<td>Frozen</td>
<td>0-star &amp; ice-making</td>
<td>Not applicable</td>
<td>0 °C, 0 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-star</td>
<td>Not applicable</td>
<td>-6 °C, -6 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2-star</td>
<td>Not applicable</td>
<td>-12 °C, -12 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3-star</td>
<td>Not applicable</td>
<td>-18 °C, -18 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Freezer (4-star)</td>
<td>Not applicable</td>
<td>-18 °C, -18 °C</td>
<td></td>
</tr>
</tbody>
</table>

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 liters (l) according to the following rules:

- The declaration of the rated capacity shall be expressed in liter (l) as multiples of 1 liter
- 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 is 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 Standard with a storage volume equal to or higher than 10 liters shall comply with the energy efficiency index limits in Table 3.

Table 3 Minimum Energy Performance Standards

<table>
<thead>
<tr>
<th>EEI</th>
<th>&lt;125</th>
</tr>
</thead>
</table>

Table 5 – Minimum Energy Efficiency Index (EEI)
5.3 Acceptance criteria for labeling and market surveillance
The energy label shall be accepted as valid when a sample unit(s) tested meets the criteria specified in Table 4.

Table 4 Acceptance criteria

<table>
<thead>
<tr>
<th>Measured parameter</th>
<th>Verification tolerances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross (total) volume</td>
<td>The measured value shall not be less than the rated value by more than 3% or 1 liter, whichever is the greater value</td>
</tr>
<tr>
<td>Storage volume</td>
<td>The measured value shall not be less than the rated value by more than 3% or 1 liter, 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.</td>
</tr>
<tr>
<td>Frozen-food storage volume</td>
<td>The measured value shall not be less than the rated value by more than 10%</td>
</tr>
<tr>
<td>Energy consumption</td>
<td>The measured value shall not be greater than the rated value ((E_{24h})) by more than 10%</td>
</tr>
<tr>
<td>Power consumption of refrigerating appliances with a storage volume below 10 liters</td>
<td>The measured value shall not be greater than the limit value laid down in by more than 0.10W at the 95% confidence level</td>
</tr>
<tr>
<td>Specific beverage appliances</td>
<td>The value of the relative humidity shall not exceed the nominal range by more than 10%</td>
</tr>
</tbody>
</table>

5.3.1 Accepted climate class
Tropical climate class as defined in Table 1 is the only climate class allowed for refrigerators, refrigerator-freezers and freezers in the member states.

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 5, with limit values rounded to two decimals.

6.2 Design and placement of the label:
The label shall be printed, visible, and fixed on both the product and the package (as illustrated in Figure 2 and Figure 3).

The energy efficiency classes shall each be represented as follows: with a fixed number of colour-coded bars as outlined in Table 5 and illustrated in Figure 2.

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.

2 The label format and layout are provided for illustrative purposes and the final design and future updates will be available on Omani Standards, Directorate General for Standards and Metrology (DGSM) registration system.
The label shall be on the most prominent part of the product packaging to be easily visible to the consumer.

**Table 7 – MIMIMUM VALUE OF THE ENERGY EFFICIENCY INDEX**

<table>
<thead>
<tr>
<th>Bar colour</th>
<th>Energy class</th>
<th>EEI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dark green</td>
<td>أ A</td>
<td>EEI &lt; 51</td>
</tr>
<tr>
<td>Green</td>
<td>ب B</td>
<td>51 &lt; EEI ≤ 64</td>
</tr>
<tr>
<td>Light green</td>
<td>ج C</td>
<td>64 &lt; EEI ≤ 80</td>
</tr>
<tr>
<td>Yellow</td>
<td>د D</td>
<td>80 &lt; EEI ≤ 100</td>
</tr>
<tr>
<td>Orange</td>
<td>ه E</td>
<td>100 &lt; EEI ≤ 125</td>
</tr>
<tr>
<td>Red</td>
<td>و F</td>
<td>125 &lt; EEI</td>
</tr>
<tr>
<td>Dark Red</td>
<td>ز G</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

6.3 Information and values contained on the label

The fields (a), (b), (c), (d), (e), (f), (g) and (h) shall comply with the following requirements:

- **Field (a):** this field shall display the logo of the Omani Standards, Directorate General for Standards and Metrology (DGSM).
- **Field (b):** this field shall reflect the energy efficiency class, which the product attained.
- **Field (c):** this field identifies Storage Volume rounded to the nearest integer; the volume for food storage (if any) in liters.
- **Field (d):** this field identifies the Frozen food storage Volume rounded to the nearest integer and star rating of the compartment with the highest share of that sum; where the refrigerating appliances has no frozen-food storage compartment(s) the supplier shall declare ‘- L’ instead of a value and leave the position for star rating blank; freezer (if any) in liters.
- **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 the refrigerator, refrigerator-freezer or freezer, this may include the following items based on the data provided in the registration form:
  - 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 (liter and cubic feet)
  - Rated capacity for storage compartment as expressed in field e (liters and cubic feet)
  - Climate class: SN, N, ST or T (could be one or more classes)
  - Classification (unit-less)
  - Annual energy consumption (AE) in kWh
• **Field (h):** this field identifies the general product information: brand name, country of origin and model number.
• **Field (i):** this field shall reflect the registration number and standard reference number.
• **Field (j):** this field shall reflect the legal statement attached to energy efficiency labels.

*Figure 2 Illustration of the label (informative)*
Figure 3  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 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.

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 volume for food storage as expressed in field d (liters and cubic feet)
- Rated volume for frozen food storage as expressed in field e (liters and cubic feet)
- Climate class shall be at least Tropical class
- Rated voltage (V)
- Rated Frequency (Hz)
- Classification (unit-less)
- Annual energy consumption (AE) in kWh

7.3 Instruction sheet
An instruction sheet or manual in 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) Supplier’s name or trade mark
b) Supplier’s model identifier
c) Climate classes in accordance with Table 1.
d) Energy efficiency class of the model in accordance with Table 5
e) Annual energy consumption (AE) 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

21
f) Storage volume of each compartment and applicable star categories in accordance with Table 2.
g) The design temperature of ‘other compartments’ within the meaning of Annex B 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 Annex B.
i) ‘Power cut safe “X” h’ defined as ‘temperature rise time’
j) ‘Freezing capacity’ in kg/24 h
k) ‘Climate class’ in accordance with Table 1, 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 fiche may be given in the form of a copy of the label, either in color or in black and white. 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 information center of the Omani Standards, Directorate General for Standards and Metrology (DGSM), and reference shall be made to the separate DGSM 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 DGSM.

Applications shall be submitted through the registration system electronically via DGSM website. The applicant shall fulfill all updated requirements of the electronic registration system and any new requirements, procedures, and regulations required by DGSM. A draft of the registration form has been provided below (the final version is the one present on the DGSM 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 ……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………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SECTION (2) – DESCRIPTION OF THE PRODUCT

Name of manufacturer

Brand name

Model number

Country of origin / Made in XXXXX

Model year

Total Volume (l)

Product dimension (m x mx m) Height x Width x Depth

Power (W)

Voltage (V)

Rated annual energy (kWh)

Climate Class (es)

Frost free (Y/N)

Built-in (Y/N)

Pantry compartment Volume in L

Special beverage compartment Volume in L

Cellar Volume in L

Fresh food compartment Volume in L

Chill compartment Volume in L

0-star or ice-making Volume in L

1-star compartment Volume in L

2-star compartment Volume in L

3-star compartment Volume in L

4-star compartment Volume in L

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

<table>
<thead>
<tr>
<th>Brand name</th>
<th>Model number</th>
<th>Registration number</th>
<th>Tested product?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yes/No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yes/No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yes/No</td>
</tr>
</tbody>
</table>
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 DGSM approved laboratory)
Note: test can be done in the manufacturer’s laboratory only if the laboratory is recognised by a
DGSM notified body to operate according to ISO 17025 – see Clause 8)

Testing method □ IEC 62552:2015
□ Other (specify )

Testing results:

Power (W) ..........................................................................................................................................................

Voltage (V) ..........................................................................................................................................................

Total Volume (l) ..................................................................................................................................................

EEI

Energy Efficiency Class [A/B/C/D/E/F/G]

Annual energy consumption (kWh/a)

Auxiliary energy (kWh/a)

Standard annual energy consumption (kWh/a)

Daily energy consumption at 16 °C (kWh/24h)

Daily energy consumption at 32 °C (kWh/24h)

\[ E_{\text{daily}} = 0.5 \times (E_{16} + E_{32}) \] (kWh/24h)
ANNEX B – Calculation of the energy efficiency index (EEI)

The refrigerating appliance must be tested as in line with the procedure/methods described in relevant parts of IEC 62552:2015.

Determination of the EEI:

Energy efficiency index EEI, expressed in % and rounded to the first decimal place, calculated as:

\[
EEI = \frac{AE}{SAE}
\]

Determination of the AE:

For all refrigerating appliances the energy consumption AE shall be determined by testing at an ambient temperature of 16 °C and 32 °C.

\[AE, \text{ expressed in kWh/a and rounded to two decimal places, shall be calculated as follows:}\]

\[AE = (365 \times \frac{E_{daily}}{L}) + E_{aux}\]

With:

- The load factor \( L = 0.9 \) for refrigerating appliances with only frozen compartments and \( L = 1.0 \) for all other appliances; and
- With \( E_{daily} \), 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:

\[E_{daily} = 0.5 \times (E_{16} + E_{32})\]

Where \( E_{16} \) and \( E_{32} \) are derived by interpolation of the energy test at the target temperatures set out in Table 2.

\( E_{aux} \), expressed in kWh/a and rounded to three decimal places. \( E_{aux} \) is limited to the ambient controlled anti-condensation heater and is determined from the heater’s power consumption at a number of ambient temperature and humidity conditions, multiplied with the probability that this ambient temperature and humidity condition occurs and summed; this result is subsequently multiplied with a loss factor to account for heat leakage into the compartment and its subsequent removal by the refrigeration system.

Determination of the standard annual energy consumption (SAE):

For all refrigerating appliances SAE, expressed in kWh/a, and rounded to two decimal places, is calculated as follows:
\[ SAE = C \times D \times \sum_{c=0}^{n} A_c \times B_c \times [V_c V] \times (N_c + V \times r_c \times M_c) \]

where

- \( c \) is the index number for a compartment type ranging from 1 to \( n \), with \( n \) the total number of compartment types;
- \( V_c \), expressed in \( dm^3 \) or liters and rounded to the first decimal place is the compartment volume;
- \( V \), expressed in \( dm^3 \) or liters and rounded to the nearest integer is the volume with \( \leq \sum_{c=1}^{n} V_c \).
- \( r_c, N_c, M_c \) and \( C \) are modelling parameters specific to each compartment with values in Table 6.
- \( A_c, B_c \) and \( D \), are 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.

Table 6: The values of the modelling parameters per compartment type

<table>
<thead>
<tr>
<th>Compartment type</th>
<th>( r_c )</th>
<th>( N_c )</th>
<th>( M_c )</th>
<th>( C )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Others</td>
<td>0.35</td>
<td></td>
<td>75</td>
<td>0.12</td>
</tr>
<tr>
<td>Special beverages</td>
<td>0.60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cellar</td>
<td>0.60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fresh food</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chill</td>
<td>1.10</td>
<td>138</td>
<td>0.12</td>
<td></td>
</tr>
<tr>
<td>0-star &amp; ice-making</td>
<td>1.20</td>
<td>138</td>
<td>0.15</td>
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</tr>
<tr>
<td>1-star</td>
<td>1.50</td>
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</tr>
<tr>
<td>2-star</td>
<td>1.80</td>
<td></td>
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<tr>
<td>3-star</td>
<td>2.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freezer (4-star)</td>
<td>2.10</td>
<td></td>
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</tr>
</tbody>
</table>

- for combi appliances with 3-or 4-star compartments is determined as follows:
  - if \( V_f/V \leq 0.3 \) then \( C = 1.3 + (0.87 \times V_f/V) \)
  - else if \( 0.3 < V_f/V < 0.7 \) then \( C = 1.87 - (1.0275 \times V_f/V) \)
  - else \( C = 1.15 \).
- for other combi appliances, \( C = 1.15 \)
- for other refrigerating appliances \( C = 1.00 \)

Where \( V_f \) is the 3- or 4-star compartment volume

\[ r_c = (T_a - T_c)/20 \] with \( T_a = 24^\circ C \) and \( T_c \) as per the values set out in Table 2
Table 7 The values of the compensation factors per compartment type

<table>
<thead>
<tr>
<th>Compartment type</th>
<th>( A_c )</th>
<th>( B_c )</th>
<th>( D )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Manual defrost</td>
<td>Auto-defrost</td>
<td>Freestanding appliance</td>
</tr>
<tr>
<td>Others</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special beverages storage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cellar</td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Fresh food</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chill</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-star &amp; ice-making</td>
<td>1.00</td>
<td>1.10</td>
<td></td>
</tr>
<tr>
<td>1-star</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2-star</td>
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</tr>
<tr>
<td>3-star</td>
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<tr>
<td>Freezer (4-star)</td>
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</tbody>
</table>

Number of external doors or compartments, whichever is lowest.

<table>
<thead>
<tr>
<th></th>
<th>( \leq 2 )</th>
<th>3</th>
<th>4</th>
<th>&gt; 4</th>
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<td></td>
</tr>
<tr>
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<tr>
<td>Fresh food</td>
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<tr>
<td>Chill</td>
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<td>0-star &amp; ice-making</td>
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<tr>
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<td>3-star</td>
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<tr>
<td>Freezer (4-star)</td>
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<td></td>
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</table>