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



## DRAFT OF UPDATING SASO 2663:0000

# AIR CONDITIONERS MINIMUM ENERGY PERFORMANCE, LABELLING AND TESTING REQUIREMENTS FOR LOW-CAPACITY WINDOW AND SINGLE-SPLIT TYPES

## ICS: 23.120 , 27.080

This document is a draft Saudi Standard circulated for comments. It is, therefore, subject to alternation and modification and may not be referred to as a Saudi Standard until approved by SASO.

# AIR CONDITIONERS MINIMUM ENERGY PERFORMANCE, LABELLING AND TESTING REQUIREMENTS FOR LOW-CAPACITY WINDOW AND SINGLE-SPLIT TYPES

## Saudi Standard No. 2663/202X

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# SASO 2663/0000

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#### Introduction

This document has been prepared by the Saudi Standards, Metrology and Quality Organization (SASO) and supersede the previous standard: SASO 2663:2021 and SASO 2663:2021/AMD1:2023 - " AIR CONDITIONERS MINIMUM ENERGY PERFORMANCE, LABELLING AND TESTING REQUIREMENTS FOR LOW-CAPACITY WINDOW AND SINGLE-SPLIT TYPES ". The standard was updated to:

- 1- Updating the Minimum Energy Performance Standard (MEPS) requirements for the Rated Energy Efficiency Ratio (EER).
- 2- Introducing Minimum Energy Performance Standard (MEPS) requirements for the Seasonal Energy Efficiency Ratio (SEER).

The objective of this document is to provide detailed performance and energy labeling requirements that air-conditioning appliances need to meet in order to enter the Saudi market.

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#### **1. SCOPE**

This standard specifies the Minimum Energy Performance Standard (MEPS) and the energy labelling requirements for single-package of window type, single split-system non-ducted air conditioners using air-cooled condensers, single split-system ducted air-conditioners using air-cooled condensers, and heat pumps using air-cooled condensers or using electric resistance for residential, commercial and industrial sectors as applicable in accordance with SASO standards.

The standard covers units with capacities up to and including 65,000 Btu/h (19.05 kW).

The standard applies to units designed to operate at frequency of 60 Hz with the following voltages:

- AC single phase circuits of 220 V or 230 V,
- DC single phase up to 400V,
- Designed for dual voltage (including DC) up to 400V,
- Voltage range including above values, and three phase circuits of 380 V or 400 V

Note: For any additional requirements such as safety, please refer to SASO related standards.

The following units are excluded from the scope of this standard:

- a) Units covered by SASO 2874 "LARGE CAPACITY AIR CONDITIONERS PERFORMANCE REQUIREMENTS AND METHODS OF TESTING" standard.
- b) Evaporative coolers.
- c) Mobile (windowless) and portable units with exhaust air duct.
- d) Individual assemblies not constituting a complete refrigeration system such as condensing units for separate use.
- e) Models that have been granted exemption by SASO due to specific design for applications such as air-conditioners that are not intended for human comfort.

#### **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 ISO 5151: Non-ducted air conditioners and heat pumps Testing and rating for performance
- SASO ISO 13253: Ducted air-conditioners and air to air heat pumps Testing and rating for performance

- SASO ISO 16358-1 Air-Cooled Air Conditioners and Air-To-Air Heat Pumps Testing and Calculating Methods for Seasonal Performance Factors Part 1: Cooling Seasonal Performance Factor.
- ISO 16358-1:2013/Cor 1:2013 Air-Cooled Air Conditioners and Air-To-Air Heat Pumps -Testing and Calculating Methods for Seasonal Performance Factors - Part 1: Cooling Seasonal Performance Factor - Technical Corrigendum 1
- ISO 16358-1:2013/Amd 1:2019 Air-Cooled Air Conditioners and Air-To-Air Heat Pumps -Testing and Calculating Methods for Seasonal Performance Factors - Part 1: Cooling Seasonal Performance Factor - Amendment 1

#### **3. TERMS AND DEFINITIONS**

#### 3.1 Annual Energy Consumption (AEC)

AEC presented in the label is equal to the Cooling Seasonal Energy Consumption (CSEC) [kWh], which is part of the ISO 16358-1:2013/Amd 1:2019 calculation tool.

#### **3.2 Compressor stages:**

#### 3.2.1 Fixed capacity unit

Equipment which does not have the possibility to change its capacity, which applies to each cooling and heating operation individually.

#### 3.2.2 Two stage capacity unit

Equipment where the capacity is varied by two steps, which applies to each cooling and heating operation individually.

#### 3.2.3 Multi-stage capacity unit

Equipment where the capacity is varied by three or four steps, which applies to each cooling and heating operation individually.

#### 3.2.4 Variable capacity unit

Equipment where the capacity is varied by five or more steps to represent continuous variable capacity, which applies to each cooling and heating operation individually.

#### **3.3** Cooling full load operation

Operation with the equipment and controls configured for the maximum continuous refrigeration capacity specified by the manufacturer and allowed by the unit controls.

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#### 3.4 Cooling half load operation

Operation with the equipment and controls configured for 50% of the maximum continuous refrigeration capacity specified by the manufacturer and allowed by the unit controls.

#### **3.5** Cooling minimum load operation

Operation with the equipment and controls configured for the minimum refrigeration capacity specified by the manufacturer and allowed by the unit controls.

#### 3.6 Cooling Seasonal Energy Consumption (CSEC)

Total annual amount of energy consumed by the equipment when it is operated for cooling in active mode.

#### 3.7 Cooling Seasonal Performance Factor (CSPF)

Ratio of the total annual amount of heat that the equipment can remove from the indoor air when operated for cooling in active mode to the total annual amount of energy consumed by the equipment during the same period.

#### 3.8 Cooling Seasonal Total Load (CSTL)

Total annual amount of heat that is removed from the indoor air when the equipment is operated for cooling in active mode.

#### 3.9 Degradation Coefficient (C<sub>D</sub>)

Coefficient that indicates efficiency loss caused by cyclic operation.

#### **3.10 Ducted air conditioners**

Encased assembly or assemblies designed primarily to provide ducted delivery of conditioned air to an enclosed space, room or zone (conditioned space).

Note 1: It can be either single-package or split-system and comprises a primary source of refrigeration for cooling and dehumidification. It can also include means for heating other than a heat pump, as well as means for circulating, cleaning, humidifying, ventilating or exhausting air. Such equipment can be provided in more than one assembly; the separated assemblies (split-systems) of which are intended to be used together.

#### 3.11 Ducted air conditioners

Encased assembly or assemblies designed primarily to provide ducted delivery of conditioned air to an enclosed space, room or zone (conditioned space).

Note 1: It can be either single-package or split-system and comprises a primary source of refrigeration for cooling and dehumidification. It can also include means for heating other than a heat pump, as well as means for circulating, cleaning, humidifying, ventilating or exhausting air. Such equipment can be provided in more than one assembly; the separated assemblies (split-systems) of which are intended to be used together.

#### 3.12 Ducted heat pump

Encased assembly or assemblies designed primarily to provide ducted delivery of conditioned air to an enclosed space, room or zone (conditioned space), including a prime source of refrigeration for heating.

Note 1: It can be constructed to remove heat from the conditioned space and discharge it to a heat sink if cooling and dehumidification are desired from the same equipment. It can also include means for circulating, cleaning, humidifying, ventilating or exhausting air. Such equipment can be provided in more than one assembly; the separated assemblies (split-systems) of which are intended to be used together.

#### 3.13 Minimum Energy Performance Standard (MEPS)

Minimum value of the EER for the rating conditions at T1, T3 and the minimum value of the calculated SEER to be achieved by the air conditioner.

#### 3.14 Non-ducted air conditioner

Encased assembly or assemblies, designed primarily to provide free delivery of conditioned air to an enclosed space, room or zone.

Note 1: It can be either single-package or split-system and comprises a primary source of refrigeration for cooling and dehumidification. It can also include means for heating other than a heat pump, as well as means for circulating, cleaning, humidifying, ventilating or exhausting air. Such equipment can be provided in more than one assembly, the separated assemblies (split-systems) of which are intended to be used together.

Note 2: An enclosed space, room or zone is known as a conditioned space.

#### 3.15 Non-ducted heat pump

Encased assembly or assemblies designed primarily to provide free delivery of conditioned air to an enclosed space, room or zone and includes a prime source of refrigeration for heating

Note 1: It can be constructed to remove heat from the conditioned space and discharge it to a heat sink if cooling and dehumidification are desired from the same equipment. It can also include means for circulating, cleaning, humidifying, ventilating or exhausting air. Such equipment can be provided in more than one assembly; the separated assemblies (split-systems) of which are intended to be used together.

Note 2: An enclosed space, room or zone is known as a conditioned space.

#### 3.16 Rated Coefficient of Performance (COP) for heating

Ratio of the rated heating capacity to the rated power input value (Unit: W/W) at any given set of rating conditions at H1.

#### 3.17 Rated Energy Efficiency Ratio (EER)

Ratio of the rated cooling capacity to the rated cooling power input value (Unit: Btu/(W.h)) at any given set of rating conditions at T1 and T3.

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#### 3.18 Rated cooling full capacity

Cooling capacity (claimed by the manufacturer) at cooling full-load operation at T1 or T3 with all indoor units functioning . (Unit: Btu/h).

#### 3.19 Rated cooling full power input

Electric power input (claimed by the manufacturer) when operated at cooling full-load operation at T1 or T3 with all indoor units functioning.

#### 3.20 Rated cooling half capacity

Cooling capacity (claimed by the manufacturer), which is 50 % of cooling full capacity at T1 condition with all indoor units functioning (Unit: Btu/h).

#### 3.21 Rated cooling half power input

Electric power input (claimed by the manufacturer) when operated at 50 % of cooling full capacity at T1 condition with all indoor units functioning.

#### 3.22 Rated cooling minimum capacity

Cooling capacity (claimed by the manufacturer) at the cooling minimum-load operation at T1 condition (Unit: Btu/h).

#### 3.23 Rated cooling minimum power input

Electric power input (claimed by the manufacturer) at the cooling minimum-load operation at T1 condition.

#### 3.24 Rated heating capacity

Heating capacity (claimed by the manufacturer) at H1 with all indoor units functioning (Unit: kW).

#### 3.25 Rated power input

Effective power input of the air conditioner model as claimed by the manufacturer during

the determination of rated cooling capacity and rated heating capacity, as applicable.

(Units: W or kW).

#### 3.26 Tested Coefficient of Performance (COP) for heating

Ratio of the tested heating capacity to the tested power input value (Unit: W/W) at any given set of rating conditions at H1.

#### 3.27 Tested cooling full capacity

Cooling capacity (measured) at cooling full-load operation at T1 or T3 with all indoor units functioning . (Unit: Btu/h).

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#### **3.28 Tested cooling full power input**

Electric power input (measured) when operated at cooling full-load operation at T1 or T3 with all indoor units functioning.

#### 3.29 Tested cooling half capacity

Cooling capacity which is (measured) at 50 % of cooling full capacity at T1 condition with all indoor units functioning (Unit: Btu/h).

#### 3.30 Tested cooling half power input

Electric power input (measured) when operated at 50 % of cooling full capacity at T1 condition with all indoor units functioning.

#### **3.31** Tested cooling minimum capacity

Cooling capacity (measured) at the cooling minimum-load operation at T1 condition (Unit: Btu/h).

#### **3.32 Tested cooling minimum power input**

Electric power input (measured) at the cooling minimum-load operation at T1 condition.

#### 3.33 Tested Energy Efficiency Ratio (EER)

Ratio of the tested cooling capacity to the tested cooling power input value (Unit: Btu/(W.h)) at any given set of rating conditions at T1 and T3.

#### 3.34 Tested heating capacity

Heating capacity at H1 with all indoor units functioning (Unit: kW).

#### **3.35 Tested power input**

The tested value of the air conditioner power input as measured during the determination of tested cooling capacity and tested heating capacity, as applicable (Unit: W or kW).

#### 3.36 Seasonal Energy Efficiency Ratio (SEER)

Cooling Seasonal Performance Factor (CSPF) multiplied by 3.412 (Unit: Btu/(W.h)).

#### 3.37 Single package windows air conditioners

A non ducted air conditioners in which a single unit contains all the components of the air conditioning unit (compressors, motors, connecting pipes and heat exchangers, and the entire air conditioning unit rests on a single base) and designed for mounting in a window or through a wall.

#### 3.38 Single split system

An air conditioner with separate indoor and outdoor components that are connected with refrigerant piping. The indoor unit is usually fixed within the conditioned space.

# 4. MINIMUM ENERGY PERFORMANCE STANDARD (MEPS) AND TESTING CONDITIONS

#### 4.1 Minimum Energy Performance Standard (MEPS)

The Rated Energy Efficiency Ratio (EER) values and the calculated Seasonal Energy Efficiency Ratio (SEER) value shall be greater than or equal to the minimum energy performance standard (MEPS) values specified in Table 1.

Table 1 – MEPS						
Air conditioner	Compressor	Sub-	Rated Cooling Capacity (CC)	EER Values		SEER
appliance type	stages	Type	categories at test condition	(Btu	/ W.h)	Value
appliance type	stages	Type	(T1) in Btu/h (or W)	T1	T3	(Btu/W.h)
Single peckage			$CC \le 24,000 (7,020W)$	9.80	7.20	8.50
of Window type	All	All	24,000 (7,020W) < CC ≤ 65,000 (19,050 W)	9.00	6.40	7.80
Calif trans using	[Eived]	Ducted			8.40	10.10
air-cooled	Capacity	Non- ducted			8.50	10.30
pumps using air	Two-stage,	Ducted	$CC \le 65,000 (19,050 \text{ W})$	11.80	8.40	
cooled condensers	Multi-stage and Variable Capacity	Non- ducted			8.50	12.80

MEPS are based on the testing conditions according to Table 2 and Table 3.

#### 4.2 Testing conditions

The testing conditions to determine the EER values are specified in Table 2.

Table 2 – REFERENCE TESTING CONDITIONS FOR COOLING AND HEATING					
	Indoor s	section	Outdoor section		
Testing conditions	Dry-Bulb °C	Wet-Bulb °C	Dry-Bulb °C	Wet-Bulb °C	
Temperature T <sub>1</sub>	27.0	19.0	35.0	24.0	
Temperature T <sub>3</sub>	29.0	19.0	46.0	24.0	
Temperature H <sub>1</sub>	20.0	15.0	7.0	6.0	

The calculated SEER requires the mandatory test points and the optional test points (if applicable) for the specified compressor stages specified in Table 3, applying the test methods expressed in SASO ISO 16358-1 and the corresponding changes mentioned in ISO 16358-1:2013/Amd 1:2019.

Table 3 – TEMPERATURE AND HUMIDITY CONDITIONS						
Test	Characteristics	Fixed	Two- stage	Multi- stage	Variable	Default Values
Standard cooling capacity	Full capacity $\phi_{ful}(46)$ (W) or (Btu/h) Full power input $P_{ful}$ (46) (W)	•	•	•	•	_
Indoor DB 29°C WB 19°C	Half capacity $\phi_{haf}$ (46) (W) or (Btu/h) Half power input $P_{haf}$ (46) (W)	-	-	D	D	0.859 x <i>ø</i> haf (35) 1.25 x <i>P</i> haf (35)
Outdoor DB 46°C WB 24°C	Minimum capacity $\phi_{min}$ (46) (W) or (Btu/h) Minimum power input $P_{min}$ (46) (W)	-	D	D	D	0.859 x ¢min (35) 1.25 x Pmin (35)
Standard cooling capacity	Full capacity $\phi_{ful}$ (35) (W) or (Btu/h) Full power input $P_{ful}$ (35) (W)			•	•	_
Indoor DB 27°C WB 19°C	Half capacity $\phi_{haf}$ (35) (W) or (Btu/h) Half power input $P_{haf}$ (35) (W)	-	-	-	-	_
Outdoor DB 35°C WB 24°C	Minimum capacity $\emptyset_{min}$ (35) (W) or (Btu/h) Minimum power input $P_{min}$ (35) (W)	1		0	0	_
Low Temperature cooling capacity	Full capacity $\phi_{ful}$ (29) (W) or (Btu/h) Full power input $P_{ful}$ (29) (W)	D	D	D	_	1.077 x ¢ful (35) 0.914 x Pful (35)
Indoor DB 27 °C WB 19 °C	Half capacity $\phi_{haf}$ (29) (W) or (Btu/h) Half power input $P_{haf}$ (29) (W)	_	_	D	D	1.077 x ¢haf (35) 0.914 x Phaf (35)
Outdoor DB 29 °C WB 24 °C	Minimum capacity $Ø_{min}$ (29) (W) or (Btu/h) Minimum power input $P_{min}$ (29) (W)	_	D	D	D	1.077 x
	Full capacity	0	—	—	-	

Low humidity		Half capacity	_	_	0	_	
and cyclic cooling Indoor DB 27 °C WB 16 °C or lower Outdoor DB 35 °C WB -	Degradation coefficient (C <sub>D</sub> )	Minimum capacity	_	0	0	_	0.27
•: Required t – : Not appli	est. cable.						
<b>D</b> : Default va	alue.						
<b>O</b> : Optional	test.						

#### 4.3 Calculation of the Seasonal Energy Efficiency Ratio (SEER)

### 4.3.1 Saudi Arabia's specific weather bin.

The specified Saudi weather data presented in table 4, shall be incorporated in the calculation tool to calculate the SEER value as per clause 4.3.2.

Table 4 – SAUDI ARABIA'S SPECIFIC WEATHER BIN					
Bin number j	Outdoor temperature $t_j$ °C	Fractional bin hours (informative)	Bin Hours n <sub>j</sub>	Reference bin hours ( <b>n</b> <sub>j</sub> )h	
1	21	0.032	$n_1$	267	
2	22	0.033	$n_2$	279	
3	23	0.033	<i>n</i> <sub>3</sub>	281	
4	24	0.037	$n_4$	314	
5	25	0.037	$n_5$	309	
6	26	0.041	n <sub>6</sub>	341	
7	27	0.042	$n_7$	357	
8	28	0.043	$n_8$	366	
9	29	0.049	$n_9$	411	
10	30	0.052	n <sub>10</sub>	435	
11	31	0.055	n <sub>11</sub>	464	
12	32	0.060	<i>n</i> <sub>12</sub>	501	
13	33	0.058	<i>n</i> <sub>13</sub>	492	
14	34	0.054	<i>n</i> <sub>14</sub>	456	

15	35	0.048	<i>n</i> <sub>15</sub>	408
16	36	0.047	<i>n</i> <sub>16</sub>	395
17	37	0.043	<i>n</i> <sub>17</sub>	360
18	38	0.042	<i>n</i> <sub>18</sub>	357
19	39	0.040	<i>n</i> <sub>19</sub>	335
20	40	0.039	<i>n</i> <sub>10</sub>	325
21	41	0.034	<i>n</i> <sub>21</sub>	290
22	42	0.029	<i>n</i> <sub>22</sub>	240
23	43	0.024	<i>n</i> <sub>23</sub>	200
24	44	0.015	<i>n</i> <sub>24</sub>	130
25	45	0.009	$n_{25}$	78
26	46	0.003	<i>n</i> <sub>26</sub>	24
			Total	8415

#### 4.3.2 Calculation tool to calculate SEER.

In order to calculate the Seasonal Energy Efficiency Ratio (SEER) value, the calculation tool shall be applied from ISO 16358-1:2013/Amd 1:2019 and based on SASO ISO 16358-1:2013 and ISO 16358-1:2013/Amd 1:2019, with the incorporation of Saudi Arabia's specific weather data under clause 4.3.1 within this standard.

#### 4.4 Declaration of the rated cooling capacity and heating capacity

The declaration of the rated cooling capacity  $CC_{rated}$  shall be expressed in terms of Btu/h and kW as presented in Table 5.

Table 5 – RULES TO EXPRESS THE RATED COOLING CAPACITY					
Rated cooling capacity (Btu/h)	Multiples (Btu/h)				
$CC_{rated} \le 24,000 (7,020 \text{ W})$	100 (30 W)				
$24,000 < CC_{rated} \le 65,000 (19,050 W)$	200 (50 W)				

For variable capacity units, the declaration of the rated cooling half capacity shall be at 50 % of the declared rated cooling full capacity, with a tolerance of  $\pm$  5 % of the declared rated cooling full capacity.

For multi-stage capacity units, if 50% is not achievable, the declared rated cooling half capacity shall be at the next step above 50% of the declared rated cooling full capacity. The rated cooling minimum capacity shall be declared at the lowest capacity control setting which allows steady-state operation of the equipment at the given test conditions.

The declaration of the rated heating capacity  $CH_{rated}$  shall be expressed (when relevant) in terms of W at a multiple of 50 W.

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#### 4.5 Declaration of the rated EER, rated COP and the calculated SEER

Values of energy efficiency, whenever published, shall be expressed in multiples of the nearest 0.05 Btu/(W.h) for the rated EER and calculated SEER and expressed in multiples of the nearest 0.05 (W/W) for the rated COP.

#### 4.6 Functional requirements related to cooling performances

Air conditioners within the scope of this standard shall satisfy the following requirements:

- Maximum cooling performance test at temperature 52°C
- Minimum cooling, freeze-up air blockage and freeze-up drip when relevant
- Condensate control and enclosure sweat performance

As expressed in SASO ISO 5151 or SASO ISO 13253.

#### 4.7 Heating performances for Air conditioner with heating and cooling functions

#### 4.7.1 General

These performances shall be stated only if the heating mode is available.

#### 4.7.2 Heating capacity

Rated values for heating capacity, input power and COP are established at H1 temperature conditions according to table 2.

For air conditioners powered with an electric resistance for the heating mode, cooling and heating modes shall not operate simultaneously, and the maximum power shall be declared by the manufacturer.

#### 4.7.3 Functional requirements related to heating performance

Air conditioners with integrated heating within the scope of this standard shall satisfy the following requirements:

- Maximum heating performance test.
- Minimum heating performance test.
- Automatic defrost performance, when relevant.

As expressed in SASO ISO 5151 or SASO ISO 13253.

#### 5. CRITERIA FOR ACCEPTABILITY OF PRODUCTS AT REGISTRATION

#### 5.1 General

Registration of products is necessary to enter the Saudi market and applies to imported and locally manufactured products.

#### **5.2 Test report requirements**

For registration of an air-conditioner for energy labelling and MEPS, the following shall be applied:

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- A test report from an accredited laboratory or a laboratory approved by the Saudi Standards, Metrology and Quality Organization (SASO), shall be attached through the registration system electronically via SASO website.
- The test report shall correspond to the model tested.
- One test for each model is sufficient.
- The test report shall be conducted in accordance with the standards referenced in Clause 2 and shall include the following requirements:
  - Standard cooling capacity tests.
  - Low temperature cooling capacity tests.
  - Low humidity cooling test and cyclic cooling test.
  - Functional requirements related to cooling performance.
  - Functional requirements related to heating performance (if applicable).

Information about the main components (compressor, heat exchanger, motors, blowers, ....) shall be presented, to clearly identify the model tested and submitted for the application.

#### **5.3 Criteria for acceptability**

The values presented in the test report shall be accepted and considered as valid when meeting the following criteria as applicable:

- a) Tested power at full load operation at (T1 and T3)  $\dots \leq 1.05$  x rated power at full load operation at (T1 and T3).
- b) Tested power at half load operation at (T1)  $\dots \leq 1.05$  x rated power at half load operation at (T1).
- c) Tested power at minimum load operation at (T1) .....  $\leq 1.05$  x rated power at minimum load operation at (T1).
- d) Tested cooling capacity at full load operation at (T1 and T3)  $\dots \ge 0.95$  x rated cooling capacity at full load operation at (T1 and T3).
- e) Tested cooling capacity at half load operation at (T1) .....  $\geq 0.95$  x rated cooling capacity at half load operation at (T1).
- f) Tested cooling capacity at minimum load operation at (T1)  $\dots \ge 0.95$  x rated cooling capacity at minimum load operation at (T1).
- g) Tested EER at full load operation at (T1 and T3) .....  $\geq$  MEPS and  $\geq$  0.95 x rated EER at full load operation (T1 and T3).
- h) Tested power at (H1) .....  $\leq 1.05$  x rated power at (H1).
- i) Tested heating capacity at (H1) ..... ≥ 0.95 x rated heating capacity at (H1).
- j) Tested COP  $\geq 0.95 \text{ x rated COP}$
- k) Rated COP (Electrical Resistance) .....  $\leq 1.0$  (W/W).

#### 6. CRITERIA FOR MARKET SURVEILLANCE

The energy label shall be accepted as valid when a single sample of an appliance or unit model subjected to an initial screening test meets the criteria specified in Clause 5.3, as applicable.

#### 7. NAMEPLATE, INSTRUCTION SHEET OR MANUAL AND ADDITIONAL SUBMITTALS

#### 7.1 General

In addition to any information needed to be displayed on the air-conditioner unit, the following information shall be marked on the nameplate of the air conditioner, in Arabic or English or both. 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 and showed in any part of the air conditioner unit or packaging shall not have any ambiguity or lead to misunderstanding of the performance of the unit.

#### **7.2 Information on the nameplate**

The information on the name plate in Arabic or English or both shall include at least:

- Manufacturer's name and trademark (if different).
- Country of origin.
- Manufacturer's model or type reference and serial number of the unit.
- Rated voltage or rated voltage range (Volts).
- Rated frequency (Hz).
- For each of cooling testing conditions as specified in Table 2, as applicable:
  - Rated current in A.
  - Rated cooling full power input in W or kW.
  - Rated cooling full capacity in Btu/h and kW.
  - Rated Energy Efficiency Ratio (EER), at full load operation, in (Btu/W.h)
- For heating test conditions according to the standard referenced in clause 2, if applicable:
  - Rated current in A.
  - Rated Input power rating in W or kW.
  - Rated Heating capacity in W or kW.
  - Rated Coefficient of Performance (COP) (W/W).
- Refrigerant used and mass of refrigerant charge in kg.

#### 7.3 Instruction sheet

An instruction sheet or manual in both Arabic and English shall be delivered with each air conditioner, including the following information:

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- The information specified in clause 7.2.
- Dimensions of the unit and its method of mounting.
- Minimum clearances between the various parts of the unit and the surrounding framework.
- Instructions necessary for the correct operation of the unit and any
  - Special precautions to be observed to ensure its safe use and Maintenance.
- Instruction for packing and unpacking the unit.
- Weight of the unit (Gross and Net).
- Any other additional information.

#### 7.4 Additional Submittals

The following documents shall be submitted, as a declaration, through the registration system electronically via SASO website:

- AC settings for full load, half load and minimum load operation, as applicable
- For Multi-stage capacity units, specify the number of steps the capacity is varied at and what it equates to the rated cooling full capacity (Percentage), for each cooling and heating operations individually.

#### 8. SEASONAL ENERGY EFFICIENCY RATIO (SEER) CLASSIFICATION

#### 8.1 General

The Seasonal Energy Efficiency Ratio (SEER) classification is used for the comparative label for products within the scope of this standard.

#### 8.2 Determination of the Seasonal Energy Efficiency Ratio (SEER) classification

The Seasonal Energy Efficiency Ratio classification is based on the calculated SEER value, in accordance with the following table 6.

Table 6 – Seasonal Energy Efficiency Ratio (SEER) Classification					
Bar color	Energ	gy class	SEER limits (Btu/W.h)		
Dark green	ſ	А	SEER $\geq$ 18.0		
Green	ب	В	$18.0> SEER \ge 15.0$		
Light green	ج	С	15.0> SEER ≥ 12.5		
Yellow	د	D	12.5> SEER ≥ 10.0		
Orange	ھ	Е	10.0> SEER ≥ 9.0		
Red	و	F	9.0> SEER ≥ 8.0		
Dark Red	j	G	8.0> SEER		

#### 9. ENERGY LABELLING REQUIREMENTS

#### 9.1 Information and values contained in the energy labels

- Field (a): This field displays the logo of the Saudi Standards, Metrology and Quality Organization (SASO).
- Field (b): This field displays the product's seasonal energy efficiency ratio (SEER) classification.
- Field (c): This field identifies the cooling information and shall include the following:
  - Rated cooling full capacity at T1 conditions (Btu/h and kW).
  - SEER value (Btu/W.h).
  - Annual energy consumption (kWh).
- Field (d): This field identifies the heating information and shall include the following:
  - Rated heating capacity in (W).
  - Rated COP in (W/W).
- Field (e): This field identifies the type of air conditioner (Window or Split).
- Field (f): This field identifies the product information including (Brand Name, Country of Manufacturing, and Model Number).
- Field (g): This field shall have a QR code representing the main characteristics of the air conditioner, this may include the following items based on the data provided in the registration form:
  - Manufacturer name
  - Model number
  - Country of origin
  - Rated voltage (V)
  - Rated cooling full power (W) at T1
  - Rated cooling full capacity at T1 (Btu/h and kW)
  - Rated Energy Efficiency Ratio (EER) at T1 full load operation
  - Rated cooling half power (W) at T1 at half load operation if applicable
  - Rated cooling half capacity at T1 (Btu/h and kW) at half load operation if applicable.
  - Rated cooling minimum power (W) at T1 at minimum load operation if applicable
  - Rated cooling minimum capacity at T1 (Btu/h and kW) at minimum load operation if applicable
  - Rated cooling full power (W) at T3
  - Rated cooling full capacity at T3 (Btu/h and kW)
  - Rated Energy Efficiency Ratio (EER) at T3 full load operation
  - Heating method (i.e. Heat pump or Electric Resistance) if applicable
  - Seasonal Energy Efficiency Ratio (SEER) classification (Alphabetical letter)
  - Seasonal Energy Efficiency Ratio (SEER) value (Btu/W.h)
  - Annual energy consumption (kWh)
  - The compressor stages as per clause 3.2 (Fixed, Two (2)-stage, Multi-stage or Variable capacity)
  - Type of Refrigerant used

- **Field (h):** This field identifies the registration number, the label serial number, and the standard reference number.
- Field (i): This field identifies the legal statement.

#### 9.2 Design and placement of the label

The label shall be printed as illustrated in Figure 1 and shall be 100 mm wide and 170 mm height.

For all types of Air Conditioners within the scope of this standard, 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.

In addition, for Split type Air Conditioners, the label shall be fixed on both indoor and outdoor units and non-removable on their packaging.



Figure 1 – Seasonal Energy Efficiency Ratio (SEER) label sample

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#### Figure 2 – Position of information on the label

#### **10. 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.