Introducing the New Requirements of Air Conditioners Standard SASO-2663 the Seasonal Energy Efficiency Ratio (SEER)

December 23rd, 2020.

كفاءة
المركز السعودي لكفاءة الطاقة
Saudi Energy Efficiency Center

المواصفات السعودية
Saudi Standards
SASO

المملكة العربية السعودية
وزارة الصناعة والثروة المعدنية

وزارة التجارة
Ministry of Commerce

الجمارك السعودية
SAUDI CUSTOMS

AGENDA

Introduction to the Saudi Energy Efficiency Centre (SEEC)/ Program (SEEP)

Rationale shifting from EER to SEER & technical team members

Timeline of events

Overview of draft Seasonal Energy Efficiency Ratio (SEER) standard

Discussion

The Saudi Energy Efficiency Center (SEEC) was established in 2010 as the custodian of energy efficiency in Saudi Arabia

المركز السعودي لكفاءة الطاقة
Saudi Energy Efficiency Center

Description

Established by the Council of Ministers Resolution in 2010

Vision & Mission

SEEC seeks to be an **international reference in the field of energy efficiency**, by working with local and international stakeholders in the government and private sector to develop knowledge and experience in the energy efficiency field and **apply best practices inside and outside kingdom.**

Objectives

Rationalize and increase the energy efficiency in production and consumption in order to preserve the KSA natural resources and enhance the economic and social welfare of KSA population.

The Saudi Energy Efficiency Program has been on a journey since 2012 to ensure that Saudi Arabia becomes a highly energy efficient country

2010

Established through a Council of Ministers resolution

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المركز السعودي لكفاءة الطاقة
Saudi Energy Efficiency Center

2012

Inter-agency effort to launch the Saudi Energy Efficiency Program (SEEP)

SEEP

2013

Full-fledged program with 12 teams

~80 initiatives at different stages (feasibility, design, execution)

2018

now

New mandate for SEEC has been approved in 2018

Scope of work expands to cover:

- Power generation including Electricity transmission and distribution
- Water desalination
- Feedstock use in industry

المملكة العربية السعودية وزارة الطاقة
وزارة الشؤون البلدية والقروية Ministry of Municipal & Rural Affairs
وزارة البيئة والمياه والزراعة Ministry of Environment Water & Agriculture
وزارة الاتصالات وتقنية المعلومات Ministry of Communications and Information Technology
مدن MODON
الهيئة الملكية لمدينة الرياض Royal Commission for Riyadh City
صندوق التنمية الصناعية السعودي Saudi Industrial Development Fund
كفاءة المركز السعودي لكفاءة الطاقة Saudi Energy Efficiency Center
مدينة الملك عبدالعزيز للعلوم والتقنية KACST
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وزارة المالية Ministry of Finance
Royal Commission for Jubail and Yanbu (RCJY) الهيئة الملكية للجبيل وينبع
Electricity & Co-generation Regulatory Authority
اللجنة الوطنية لكود البناء السعودي Saudi Building Code National Committee
SCE الهيئة السعودية للمهندسين Saudi Council of Engineers
أرامكو السعودية saudi aramco
وزارة النقل Transport Ministry
وزارة الاقتصاد والتخطيط Ministry of Economy & Planning
وزارة الإسكان Ministry of Housing
الجمارك السعودية Saudi Customs
هيئة السوق المالية Capital Market Authority
هيئة المدن الاقتصادية Economic Cities Authority
Clean Development Mechanism Designated National Authority
المواصفات السعودية Saudi Standards SASO
مدينة الملك عبد الله للطاقة الذرية والمتجددة KA•CARE
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كفاءة

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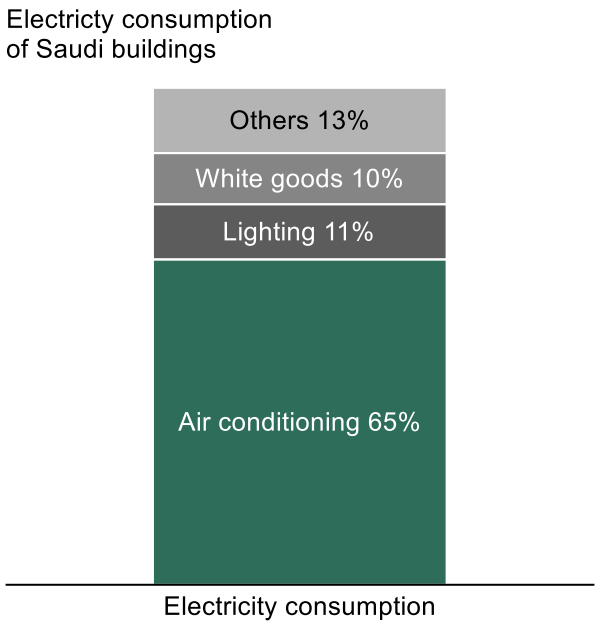
Continuous efforts to mitigate the share of Air Conditioning's consumption with the increased demand

Cooling accounts for **most of the electricity** consumption in Saudi buildings

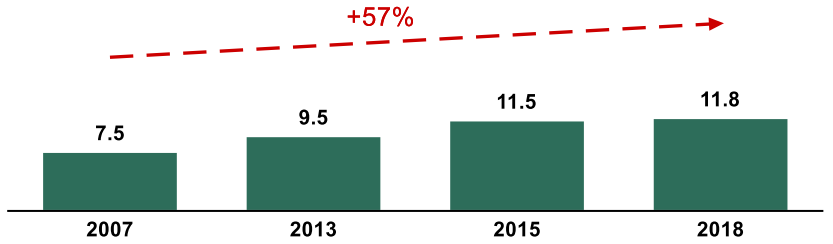


Source: SEEC – A study made Building team (2016)

To **reduce** the consumption of air conditioning in the Kingdom, SEEC has **leveraged all the available levers**, e.g. regulation, awareness and funding

Regulation

- **SEEC has succeeded in increasing the Minimum Energy Performance Standard (MEPS)** for split ACs by **57%** in the past few years from 7.5 EER in 2007 to **11.8 EER in 2018**



Awareness

- Extensive **awareness campaigns** to promote "right behaviors" for lower consumption for instant:
  - Increase of the **thermostat temperature** to 24°C
  - Regular **maintenance of the AC**
  - **Switch off** if AC is not used

Funding

- **Developed initiative concepts** for High Efficiency ACs.

Rational approach to introduce the Seasonal Energy Efficiency Ratio (EER) and shift from the Energy Efficiency Ratio (EER) metric

EER/SEER

Metric	Energy Efficiency Ratio (EER)	Seasonal Energy Efficiency Ratio (SEER)
Calculation Method	Calculated using a constant indoor temperature as well as **constant** outside temperature	Calculated using a constant indoor temperature and **varying** outdoor temperatures. • **Takes into consideration the country weather bin** above 20 °C and calculates the **Annual** Energy consumption and Efficiency.
Technology	Dependent on fixed parameters and **does not differentiate** between **Fixed and Variable capacity.**	Could be **applied for Fixed capacity and** for **Variable capacity** air conditioners.
Rationale introducing SEER metric	1. **More accurate** metric in measuring the efficiency of AC's **than EER.** 2. **Penetration of AC's** which operate at partial load **into** the **Saudi market.**	3. **Fair metric towards** AC's which operate at partial load (e.g., AC's with **Inverter technology**). 4. **Inclusion of Annual Energy Consumption** calculation as part of the calculation tool to find SEER

Approach

Reference Standard	Criteria
ISO 16358-1:2013/ADM.1:2019 **AHRI 211/241** **EN 14825**	• **Simplicity** of equation used • Scope and **equipment coverage** • Countries applied and **applicability in K.S.A** • **Map** onto the current **MEPS/ Testing point**

A team of representatives worked on developing the Seasonal Energy Efficiency Ratio (SEER) standard for K.S.A's specific conditions

Stakeholders

Government	AC Manufacturers	Importers	Private Labs

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A structured approach applied to develop the Seasonal Energy Efficiency Ratio (SEER) standard for Saudi Arabia's specific conditions

May 2019

Kickoff SEER meeting

- **Onboarding** Technical Committee (T.C) **members** to develop SEER standard for K.S.A conditions.
- **Define** T.C's **scope** and working mechanism.

July 2019

2nd SEER meeting

- **Benchmark referenced standards** upon a set of established criteria.
- **Analysis of** the Saudi weather **Bin hours**.

October 2019

3rd SEER meeting

- **Determine** which **reference standard/ calculation tool** to incorporate in the Saudi SEER standard.

February 2020

4th SEER meeting

- **Conduct** additional **testing** to investigate SEER metric.
- **Initial mapping** of SEER label rating **levels.**

June 2020

5th SEER Meeting

- **Finalize Saudi** weather **Bin hours.**
- Proposed SEER rating levels.

October – Mid-December 2020

- Initiative **approval** from SEEP's **higher authorities**.
- **Finalize drafting** SEER **Standard** with T.C members.
- **Submit draft standard to** World Trade Organization (**W.T.O**) platform for public review.
  - ***Details next slide***

Today

- **Workshop for relevant bodies** *Introducing the New Requirements of Air Conditioners Standard SASO-2663 – SEER.*

A structured approach applied to develop the Seasonal Energy Efficiency Ratio (SEER) standard for Saudi Arabia's specific conditions

WORLD TRADE ORGANIZATION

G/TBT/N/SAU/1167

11 December 2020

(20-8939) Page: 1/3

Committee on Technical Barriers to Trade Original: English

NOTIFICATION

The following notification is being circulated in accordance with Article 10.6

1.	**Notifying Member:** KINGDOM OF SAUDI ARABIA **If applicable, name of local government involved (Article 3.2 and 7.2):**
2.	**Agency responsible:** Saudi Standards, Metrology and Quality Organization (SASO) **Name and address (including telephone and fax numbers, email and website addresses, if available) of agency or authority designated to handle comments regarding the notification shall be indicated if different from above:** Saudi Standards, Metrology and Quality Organization (SASO) P. O .BOX : 3437 Riyadh 11471 Tel: +966(11) 4520000 Ext : (1378-1381-1383) Fax +966(11) 4520193, +966(11) 4520086 Email: enquirypoint@saso.gov.sa Website: http://www.saso.gov.sa
3.	**Notified under Article 2.9.2 [X], 2.10.1 [ ], 5.6.2 [ ], 5.7.1 [ ], other:**
4.	**Products covered (HS or CCCN where applicable, otherwise national tariff heading. ICS numbers may be provided in addition, where applicable):** Ventilators. Fans. Air-conditioners (ICS 23.120), Heat pumps (ICS 27.080)

11th December 2020

- **Submit draft standard to** World Trade Organization (**W.T.O**) platform for public review.

❑ Draft SEER standard is available for the public's review at SASO website: Link.

9th February 2021

- **Final date for comments on draft SEER standard at W.T.O platform.**

Q2 2021

- **SASO board's approval date.**

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Draft Seasonal Energy Efficiency Ratio (SEER) standard - *Disclaimer*

Disclaimer

This document reflects a draft version of the Standard and is being provided for informational purposes. This document is not to be considered reflective of the final standard, and all information contained herein is subject to change upon further review by the owners

Overview of draft Seasonal Energy Efficiency Ratio (SEER) standard (1/8)

SASO 2663:2021 AIR CONDITIONERS MINIMUM ENERGY PERFORMANCE, LABELLING AND TESTING REQUIREMENTS FOR LOW-CAPACITY WINDOW TYPE AND SINGLE-SPLIT

Standard Clauses

Introduction

The standard was updated in order to:

1. **Introducing** the Seasonal Energy Efficiency Ratio **(SEER) metric.**
2. **Changing** the **rating metric** from Energy Efficiency Ratio (EER) **to** Seasonal Energy Efficiency Ratio **(SEER)**.
3. **Introducing SEER calculation tool.**
4. **Requirement** of an **additional testing point** to find SEER rating for **partial load calculations.**
5. **Inclusion of Saudi Arabia's specific weather bin hours** as a part of the calculation tool.
6. **Changing the rating levels**, applying **SEER** rating

2) Normative References

- SASO-2681:2013 / SASO GSO ISO 5151: Non-ducted air conditioners and heat pumps — Testing and rating for performance
- SASO-2682:2013 / SASO GSO 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

Overview of draft Seasonal Energy Efficiency Ratio (SEER) standard (2/8)

SASO 2663:2021 AIR CONDITIONERS MINIMUM ENERGY PERFORMANCE, LABELLING AND TESTING REQUIREMENTS FOR LOW-CAPACITY WINDOW TYPE AND SINGLE-SPLIT

Standard Clauses

3) Terms and Definitions

- Annual Energy Consumption (AEC)
- Compressor Stages: Fixed capacity unit (Full load operation only), Two (2)-stage capacity unit, Multi-stage capacity unit, Variable capacity unit (Partial load operation)
- Cooling Seasonal Performance Factor (CSPF)
- Cooling full-load operation
- Cooling partial-load operation
- Cooling seasonal energy consumption
- Cooling seasonal total load (CSTL)
- Degradation Coefficient (C_d)
- Half-Load operating conditions
- Minimum-load operation
- Partial load operation
- Rated Seasonal Energy Efficiency Ratio (SEER)
- Seasonal Energy Efficiency Ratio (SEER) Rating
- Standard cooling half capacity
- Standard cooling half power input
- Standard cooling minimum capacity
- Standard cooling minimum power input
- Tested (measured) Energy Efficiency Ratio (EER) - at full load operation
- Tested (measured) capacity - at full load operation
- Tested (measured) capacity - at partial load operation
- Tested (measured) power - at full load operation
- Tested (measured) Energy Efficiency Ratio (EER) – at Partial load operation
- Tested (measured) power - at partial load operation

Overview of draft Seasonal Energy Efficiency Ratio (SEER) standard (3/8)

SASO 2663:2021 AIR CONDITIONERS MINIMUM ENERGY PERFORMANCE, LABELLING AND TESTING REQUIREMENTS FOR LOW-CAPACITY WINDOW TYPE AND SINGLE-SPLIT

Standard Clauses

4) Minimum Energy Performance Standard (MEPS)

- 4.1) General

MEPS are based on the rated cooling capacity for the rated EER at rating conditions (T1) and (T3), according to Table 2, below.

- **MEPS are the same** and have not been modified.

Table 2 – MINIMUM REQUIRED EER (MEPS) APPLICABLE

Air conditioner appliance type	Rated Cooling Capacity (CC) categories at test condition (T1) in (Btu/h) (or W)	EER Values (Btu/h)/W	
		T1	T3
Single package of Window type – category A	CC ≤ 24,000 (7,050W)	9.80	7.00
Single package of Window type – category B	24,000 (7,050W) < CC ≤ 65,000 (19,050 W)	9.00	6.20
Split type ducted and non-ducted using air-cooled condensers, heat pumps using air cooled condensers	CC ≤ 65,000 (19,050 W)	11.80	8.30

Overview of draft Seasonal Energy Efficiency Ratio (SEER) standard (4/8)

SASO 2663:2021 AIR CONDITIONERS MINIMUM ENERGY PERFORMANCE, LABELLING AND TESTING REQUIREMENTS FOR LOW-CAPACITY WINDOW TYPE AND SINGLE-SPLIT

Standard Clauses

5) Criteria for acceptability of products at registration

- 5.3) Product using test report to justify the performance

› **5.3.1) General**

A test report from an accredited laboratory or a laboratory approved by SASO shall be presented for registration. This test report shall include the mandatory test results as shown below in Table 4 for EER at T1 (Full load operation and partial load operation, as applicable) and T3 (Full load operation).

Table 4 – Temperature and Humidity Conditions

Test	Characteristics	Fixed	Two-stage	Multi-stage	Variable
Standard cooling capacity Indoor DB 29°C WB 19°C Outdoor DB 46°C WB 24°C	Full capacity $\emptyset_{ful}$(46) (W) or (Btu/h)	■	■	■	■
	Full power input P_{ful} (46) (W)	■	■	■	■
Standard cooling capacity Indoor DB 27°C WB 19°C Outdoor DB 35°C WB 24°C	Full capacity $\emptyset_{ful}$ (35) (W) or (Btu/h)	■	■	■	■
	Full power input P_{ful} (35) (W)	■	■	■	■
	Half capacity $\emptyset_{haf}$ (35) (W) or (Btu/h)	–	–	■	■
	Half power input P_{haf} (35) (W)	–	–	■	■
	Minimum capacity $\emptyset_{haf}$ (35) (W) or (Btu/h)	–	■	–	–
	Minimum power input P_{haf} (35) (W)	–	■	–	–

■ Required Test.
– Not Required.

Overview of draft Seasonal Energy Efficiency Ratio (SEER) standard (5/8)

SASO 2663:2021 AIR CONDITIONERS MINIMUM ENERGY PERFORMANCE, LABELLING AND TESTING REQUIREMENTS FOR LOW-CAPACITY WINDOW TYPE AND SINGLE-SPLIT

Standard Clauses

8) Energy rating classification

- 8.2) Saudi Arabia's Specific Weather Bin.

The specified Saudi weather data, presented in table 5, shall be applied to the SASO ISO 16358-1:2013, Clause 6 (Calculations) and incorporated into ISO 16358-1:2013/AMD 1:2019 calculation tool, to find the SEER rating and its relevant measurements, such as the Cooling Seasonal Energy Consumption (CSEC).

- **Saudi Arabia's Specific weather bin shall be incorporated into the SLS system.**

Table 5 – SAUDI ARABIA'S SPECIFIC WEATHER BIN

Outdoor temperature (°C)	bin hours (h)	Outdoor temperature (°C)	bin hours (h)
21	267	34	456
22	279	35	408
23	281	36	395
24	314	37	360
25	309	38	357
26	341	39	335
27	357	40	325
28	366	41	290
29	411	42	240
30	435	43	200
31	464	44	130
32	501	45	78
33	492	46	24

Total: 8415

Overview of draft Seasonal Energy Efficiency Ratio (SEER) standard (6/8)

SASO 2663:2021 AIR CONDITIONERS MINIMUM ENERGY PERFORMANCE, LABELLING AND TESTING REQUIREMENTS FOR LOW-CAPACITY WINDOW TYPE AND SINGLE-SPLIT

Standard Clauses

8.3) Calculation tool to calculate SEER.

In order to calculate the Seasonal Energy Efficiency Ratio (SEER) rating for products covered within the scope of this standard, the calculation tool shall be applied from ISO 16358-1:2013/AMD 1:2019 and based on SASO ISO 16358-1:2013, Clause 6 (Calculations), with the incorporation of Saudi Arabia's specific weather data under Clause 8.2 within this standard.

- **Calculation tool shall be incorporated into the SLS system.**

8.4) Determination of the energy efficiency class

The seasonal energy efficiency class is then determined in accordance with the following table, where the SEER (Seasonal Energy Efficiency Ratio) is calculated applying to the calculations tool specified in clause 8.3 with the incorporation of Saudi Arabia's weather Bin as per clause 8.2

Table 6 – SEASONAL ENERGY EFFICIENCY (SEER) Classification

Bar color	Energy class		SEER limits (Rated value) (Btu/W.h)
Dark green	أ	A	SEER ≥ 18.0
Green	ب	B	18.0> SEER ≥ 15.0
Light green	ج	C	15.0> SEER ≥ 12.5
Yellow	د	D	12.5> SEER ≥ 10.0
Orange	هـ	E	10.0> SEER ≥ 9.0
Red	و	F	9.0> SEER ≥ 8.0
Dark Red	ز	G	8.0> SEER

Overview of draft Seasonal Energy Efficiency Ratio (SEER) standard (7/8)

SASO 2663:2021 AIR CONDITIONERS MINIMUM ENERGY PERFORMANCE, LABELLING AND TESTING REQUIREMENTS FOR LOW-CAPACITY WINDOW TYPE AND SINGLE-SPLIT

Standard Clauses

8.3) Calculation tool to calculate SEER.

The degradation coefficient (C_D) shall be incorporated into the calculation tool as 0.2 for Fixed capacity units and 0.27 for Two (2)-stage capacity units, Multi-stage capacity units and Variable capacity units.

- *Different* than ISO 16358-1:2013/AMD 1:2019, which is set as 0.27 for all AC's.

7.4) Additional Submittals

The following information shall be provided as part of the product package and submitted through the registration system electronically via SASO website.

- AC setting for full load and partial load operation, if applicable
- Specification the compressor stages as per clause 3.3 (Fixed, Two (2)-stage, Multi-stage or Variable capacity)

Overview of draft Seasonal Energy Efficiency Ratio (SEER) standard (8/8)

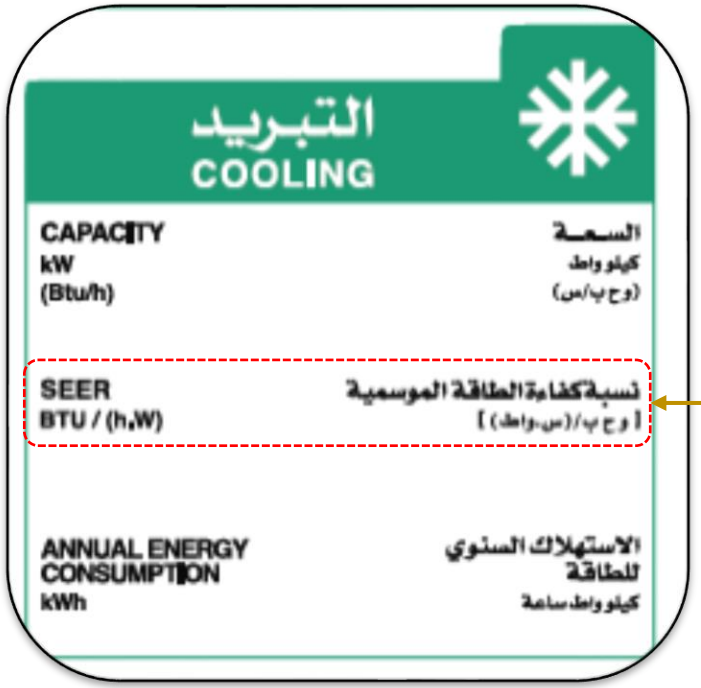
SASO 2663:2021 AIR CONDITIONERS MINIMUM ENERGY PERFORMANCE, LABELLING AND TESTING REQUIREMENTS FOR LOW-CAPACITY WINDOW TYPE AND SINGLE-SPLIT

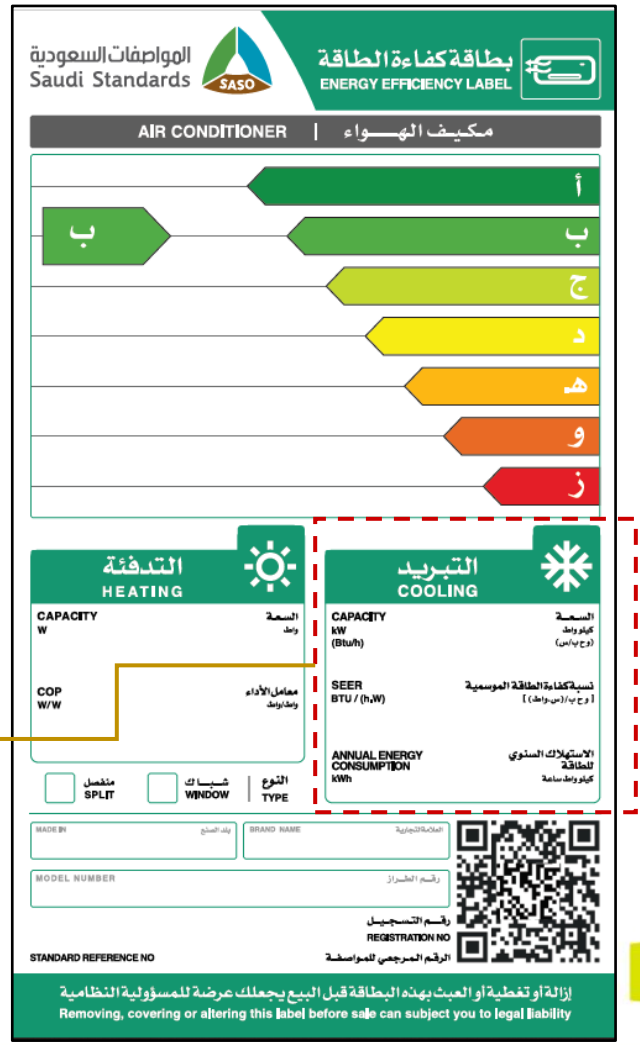
Standard Clauses

9.2) Design and placement of the label

The new label is subjected to the following changes:

- **Seasonal Energy Efficiency Ratio (SEER) energy efficiency class.**
- **Rated Seasonal Energy Efficiency Ratio value (Btu/W.h)**





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Forward looking and next steps

Next steps

1) Public feedback on draft SEER standard at:

- SASO website: https://www.saso.gov.sa/ar/mediacenter/public_multimedia/Pages/118_1442.aspx
  - End date: February 9th, 2021.

2) Second workshop, post standard approval, focusing on enforcement dates and registration aspects on SASO's SLS system.

Questions!

شكراً لكم THANK YOU