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

DRAFT OF UPDATING OF SASO 2874/0000

LARGE CAPACITY AIR CONDITIONERS – PERFORMANCE REQUIREMENTS AND METHODS OF TESTING

ICS: 23.120 , 27.080

Content

INTRODUCTION

All requirements outlined in this document shall supersede the requirements of the previous standard: SASO-2874 “AIR CONDITIONERS - MINIMUM ENERGY PERFORMANCE REQUIREMENTS AND TESTING REQUIRMENTS”. This standard was updated to:

1- Update the Energy Efficiency Ratio (EER) Minimum Energy Performance Standard (MEPS) requirements, based on the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE:2022) values.

2- Introduce the Seasonal Energy Efficiency Ratio (SEER) metric, based on the International Organization for Standardization (ISO) reference standard and the European Standard (EN).

3- Introduce partial load rating metrics (Integrated Energy Efficiency Ratio (IEER) and Integrated Part Load Value (IPLV), based on the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) reference standards for all partial-load rating conditions.

4- Change Close control air conditioners type to Ceiling-mounted, Floor-Mounted air conditioners and condensing units serving computer room types.

1. SCOPE

This standard specifies the Minimum Energy Performance standard (MEPS) requirements and testing methods for large capacity air conditioners for the following main product categories:

- Electrically operated air conditioners.
- Condensing units.
- Chillers.
- Absorption chillers.
- Electrically operated variable refrigerant flow (VRF) air conditioners.
- Ceiling-mounted, Floor-Mounted air conditioners and condensing units serving computer rooms.

The standard applies to air conditioners designed to operate with single-phase circuits or Three-phase circuits (Frequency of 60 Hz):
Note 1: Air conditioners having special voltages, not under the scope of this standard, shall be subject to SASO approval, in condition that they do not exceed 600 V.

Note 2: Voltages of Water-cooled chillers up to 15,000 V are included in the scope of this standard.

Air conditioners categories, capacities, and reference testing standards falling under the scope of this standard are detailed in clause 5.

Exclusions:

- Air conditioners not specified in clause 5.
- Single Package Vertical Air-conditioner (SPVAC)
- Direct Expansion-Dedicated Outdoor Air System (DX-DOAS) Units
- Portable (mobile) Air conditioners
- Process Cooling Chiller
- Desert Cooler
- Explosion proof air conditioner
- Swimming pool air conditioner
- Air conditioners that are covered under the scope of the latest version of SASO 2663 standard: ”Air conditioners minimum energy performance, labelling and testing requirements for low-capacity window type and single-split.”

2. NORMATIVE REFERENCES

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

- **AHRI 340/360:2022**: "Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment".
- **AHRI 365:2009**:"Commercial and Industrial Unitary Air-Conditioning Condensing Units".
- **AHRI 550/590:2023**: "Performance Rating of Water-Chilling and Heat Pump Water-Heating Packages Using the Vapor Compression Cycle".
- **AHRI 560:2023**: Performance Rating of Water-cooled Lithium Bromide Absorption Water-chilling and Water-heating Packages.
- **AHRI 1230:2023**: "Performance Rating of Variable Refrigerant Flow (VRF) Multi-Split Air-Conditioning and Heat Pump Equipment".
- **AHRI 1360:2022**: "Performance Rating of Computer and Data Processing Room Air Conditioners".
- **ASHRAE 90.1:2022**: "Energy standard for Buildings Except Low-Rise Residential Buildings".
- **EN 14511:2022:** "Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors".
- **EN 14825:2022:** "Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling, commercial and process cooling - Testing and rating at part load conditions and calculation of seasonal performance".
- **SASO GSO 1899**: "GCC Standard Voltages and Frequencies for Alternating Current Distribution Systems".
- **SASO ISO 15042:2017**: "Multiple split-system air conditioners and air to air heat pumps – Testing and rating for performance".
- **SASO 2663**: "Air conditioners minimum energy performance, labelling and testing requirements for low-capacity window type and single-split".
- **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".

3. TERMS AND DEFINITIONS

For the purposes of this Standard, the following terms and definitions shall apply.

3.1 Absorption chillers

A factory designed and prefabricated assembly employing water as the refrigerant and consisting of an evaporator, absorber, condenser, generator(s) and solution heat exchangers, with interconnections and accessories used for chilling or heating water. The package utilizes single or multiple reconcentration of an absorbent solution. The reconcentration of the absorbent are known as effects. A single effect package employs one step reconcentration of the absorbent in the generator. Water vapor is released after the heat energy is introduced into the generator. The concentrated absorbent is returned to the absorber where it can absorb water vapor flashed off in the evaporator. A double effect package employs a two-step reconcentration of the absorbent through the use of an additional high temperature generator. An absorption package can be further defined by the following:

3.1.1 Direct fired package

This type of package reconcentrates the absorbent from heat energy through the combustion of natural gas, LP gas or oil.

3.1.2 Indirect fired package

This type of package reconcentrates the absorbent from heat energy from steam or hot water.

3.2 Adjustment factor (Kadj)

Factor used to adapt the performance of air conditioning not designed for operation testing condition.

3.3 Ceiling-mounted Unit.

A type of and Data Processing Room Air Conditioners (CDPR) with an Indoor Unit marketed to be installed above a dropped ceiling inside a building with one airflow direction through the unit (horizontal) and multiple airflow connections. Discharge from the unit consists of either Ducted Discharge or Free Air Discharge. Return to the unit consists of either Ducted Return or Free Air Return.

3.4 Chillers

A factory-made and prefabricated assembly (not necessarily shipped as one package) of one or more compressors, condensers and evaporators, with interconnections and accessories designed for the purpose of cooling or heating water. It is a machine specifically designed to make use of a vapor compression refrigeration cycle to remove heat from water and reject the heat to a cooling medium, usually air or water. The refrigerant condenser may or may not be an integral part of the package.

3.5 Condensing units

A factory-made assembly of refrigeration components designed to compress and liquefy a specific refrigerant. It consists of one or more refrigerant compressors, refrigerant condensers

(air-cooled, evaporatively – cooled, and/or water-cooled), condenser fans and motors (where used) and factory-supplied accessories.

3.6 Condenser
A refrigeration system component which condenses refrigerant vapor. Desuperheating and sub-cooling of the refrigerant may occur as well.

3.6.1 Air-cooled condenser
A component which condenses refrigerant vapor by rejecting heat to air mechanically circulated over its heat transfer surface causing a rise in the air temperature.

3.6.2 Evaporatively-cooled condenser
A component which condenses refrigerant vapor by rejecting heat to a water and air mixture mechanically circulated over its heat transfer surface, causing evaporation of the water and an increase in the enthalpy of the air.

3.6.3 Water-cooled condenser
A component which utilizes refrigerant-to-water heat transfer means, causing the refrigerant to condense and the water to be heated.

3.7 Computer and Data Processing Room Air Conditioner (CDPR)
An air conditioning unit specifically marketed for cooling Data Centers and ITE that consist of one or more factory-made assemblies, that include a direct expansion evaporator or chilled water-cooling coil, an air-moving device(s) and air-filtering device(s). The air conditioner can include a compressor, condenser, Humidifier, or reheating function. Functions alone or in combination with a cooling plant, can include providing air filtration, air circulation, cooling, and humidity control if the necessary options are included for humidity control.

3.8 Desert Cooler
A device that cools air through the evaporation of water. Evaporative cooling differs from typical air conditioning systems, which use vapor-compression or absorption refrigeration cycles.

3.9 Direct Expansion-Dedicated Outdoor Air System (DX-DOAS) Units
A type of air-cooled, evaporatively-cooled, or water-cooled air-conditioner, or an air-source or water source heat pump, that is a factory assembled product designed and marketed and sold to provide ventilation and dehumidification of 100 % Outdoor Air.

3.10 Ducted air conditioners
An air conditioner model configuration where the indoor side is situated remote to the space to be conditioned. The conditioned air is supplied or extracted via a duct.

3.11 Electrically operated unitary air conditioners
One or more factory-made assemblies, which normally include a cooling coil, an air moving device, a compressor(s) and condenser combination, and may include a heating function as well. Where such equipment is provided in more than one assembly, the separate assemblies shall be designed to be used together, and the requirements of rating outlined in this standard shall be based upon the use of matched assemblies. These assemblies are electrically operated, vapor compression refrigeration systems.

3.12 Electrically Operated Variable Refrigerant Flow (VRF) air conditioners
An engineered direct expansion (DX) multi-split system incorporating at least one variable capacity compressor distributing refrigerant through a piping network to multiple indoor fan coil units each capable of individual zone temperature control, through proprietary zone temperature control devices and common communications network. Variable refrigerant flow implies three or more steps of control on common, inter-connecting piping.

3.13 Energy Efficiency Ratio (EER)
A ratio of the Cooling Capacity in Btu/h to the power input values in watts at any given set of rating conditions.

3.14 Explosion proof air conditioner
An HVAC unit needs to be able to withstand any explosion from within its housing .

3.15 Floor-mounted unit
A type of CDPR with an Indoor Unit that is marketed to be installed on a raised floor, floor stand, or a solid floor inside the building. These have two airflow configuration options: direction and connection. Each unit can be a combination of one direction and two connections (one Discharge from unit and one Return to unit). Discharge from the unit consists of either Ducted Discharge, Free Air Discharge, or Raised Floor Plenum Discharge. Return to the unit consists of either Ducted Return, Free Air Return, or Raised Floor Plenum Return Flow direction of the Floor-mounted Unit consists of either:

3.15.1 Downflow
A Floor-mounted Unit where return air enters above the top of the cooling coil and discharge air leaves below the bottom of the cooling coil.

3.15.2 Horizontal-flow
A Floor-mounted Unit that is neither a Downflow nor an Upflow unit.

3.15.3 Upflow
A Floor-mounted Unit where return air enters below the bottom of the cooling coil and discharge air leaves above the top of the cooling coil.

3.16 Integrated Part-Load Value (IPLV)
A single-number figure of merit based on part-load EER, expressing part-load efficiency for air-conditioning and heat pump equipment on the basis of weighted operation at various load capacities for the equipment.

3.17 Integrated Energy Efficiency Ratio (IEER)
A single-number figure of merit based on part-load EER, expressing part-load efficiency for air-conditioning and heat pump equipment on the basis of weighted operation at various load capacities for the equipment.

3.18 Maximum operating conditions
The maximum allowable working conditions that a system, a part of a system or equipment is designed to and/or can withstand.

3.19 Net sensible cooling capacity
The rate, expressed in Btu/h or kW, or both, where the equipment removes sensible heat from the air passing through the unit under specified conditions of operation, including the fan energy dissipated into the conditioned space.

3.20 Net Sensible Coefficient of Performance (NSensCOP)
A ratio of the Net Sensible Cooling Capacity in kilowatts to the total power input in kilowatts (excluding reheaters and Humidifiers) at any given set of Rating Conditions.

3.21 Non-ducted air conditioner
An air conditioner model configuration where the indoor side is situated partly or wholly within the space to be conditioned. The conditioned air is supplied and extracted directly to and from the conditioned space.

3.22 Portable (mobile) air conditioners
A mobile self-contained air conditioner model that can be moved from place to place.

3.23 Process Cooling Chiller
Process Cooling Chillers provide cooling or extract heat mainly from a fluid required for dedicated process, maintain temperature during a process or cool an equipment or its components. Process chiller applications require operating duty that is beyond the domain of AHRI standard rating conditions , also includes additional accessories like water pumps , heater exchangers , expansion tank & water pipes.

3.24 Rated cooling capacity
The rated capacity claimed by the manufacturer of an air conditioner model determined as per the relevant testing and rating standard.

Note: Conversion factor: 1000 Btu/h equals 0.293 kW.

3.25 Rated power
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.

3.26 Rated voltage
The electric potential or potential difference claimed by the manufacturer of an air conditioner model for which a piece of equipment is designed.

3.27 Rated frequency
The number of cycles per second through which an alternating electric current pass as claimed by the manufacturer of an air conditioner model.

3.28 Single Package Vertical Air-conditioner (SPVAC)
A type of air-cooled small or large package air conditioning and heating equipment; factory assembled as a single package having its major components arranged vertically, which is an encased combination of cooling and optional heating components. This equipment is intended for exterior mounting on, adjacent interior to, or through, an outside wall. It may contain separate indoor grille(s), outdoor louvers, various ventilation options, indoor free air discharge, indoor ductwork, wall plenum or sleeve. Heating components may include electrical resistance, steam, hot water, gas or no heat, but shall not include reverse cycle refrigeration as a heating means. SPVAC, either alone or in combination with a heating plant, shall provide air-circulation, air-cleaning, cooling with controlled temperature and dehumidification, and may include the function of heating, humidifying and ventilation.

3.29 Split system
An air conditioner with separate indoor and outdoor components that are connected with refrigerant piping. The indoor unit usually lies within the conditioned space and may be installed or portable/mobile.

3.30 SASO registration system
The registration system used by SASO consist of a web application where an applicant (manufacture/importer/…) can record all information needed to identify the product and required evidence to enter the Saudi market. Information is submitted through the application to SASO for verification.

3.31 Seasonal Energy Efficiency Ratio (SEER)
Cooling Seasonal Performance Factor (CSPF) multiplied by 3.412 (Unit: Btu/(W.h)).

3.31.1 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.

3.32 Seasonal Energy Efficiency Ratio in active mode ($SEER_{on}$)
Average energy efficiency ratio of the unit in active mode for the space cooling function, determined from part load and bin-specific energy efficiency ratios (EERbin(Tj)) and weighted by the bin hours where the bin condition occurs, based on the referenced EN standard.

3.33 VRF Air-source System.
A VRF Heat Pump with Single Module or Combined Module Outdoor Units that have air-to-refrigerant heat exchangers.

3.34 VRF Heat Recovery System.
A VRF Air-source System or VRF Water-source Heat Pump capable of providing simultaneous heating and cooling operation through a Heat Recovery Control Unit, where recovered energy from the Indoor Units operating in one mode can be transferred to one or more other Indoor Units operating in the other mode.

3.35 Water-chilling or Water-heating Package.
A factory-made and prefabricated assembly (not necessarily shipped as one package) of one or more compressors, Condensers and Evaporators, with interconnections and accessories designed for the purpose of cooling or heating water. It is a machine specifically designed to make use of a vapor compression refrigeration cycle to remove heat from water and reject the heat to a cooling medium, usually air or water. The refrigerant Condenser can be an integral or separate part of the package.

4. TESTING REQUIREMENTS

4.1 Voltages and frequency

Products are tested under the rated voltage and rated frequency (60Hz) according to SASO GSO 1899, for equipment with dual rated frequencies (50-60 Hz), the equipment shall be tested at 60 Hz.

If the tested voltage is not mentioned in the reference testing standards, Table 1 below shall be applied:

Table 1 – Voltages for capacity and performance tests

Rated voltage [a] V	Test voltage [b] V
90 to 109	100
110 to 127	115
180 to 207	200
208 to 253	230
254 to 341	265
342 to 420	400
421 to 506	460
507 to 633	575

[a] For equipment with dual voltage, such as 115/230 and 220/440, the test voltage would be 115 V and 230 V in the first example, and 230 V and 460 V in the second example. For equipment with an extended voltage range, such as 110 V to 120 V or 220 V to 240 V, the test voltage would be 115 V or 230 V respectively. Where the extended voltage range spans two or more of the rated voltage ranges, the mean of the rated voltage shall be used to determine the test voltage of this table.

Example: For equipment with an extended voltage range of 200 V to 220 V, the test voltage would be 230V, based on the mean voltage of 210 V.

[b] The voltages in this table are for capacity and performance tests other than the maximum cooling performance tests.

Note: For voltages over 600 and up to 15,000 V, admissible tested voltage is presented for each relevant standard.

4.2 Reference test conditions at full load operation

The reference testing conditions at full load are presented in Table 2.

Tests are performed according to the relevant reference testing standards corresponding to the type of air conditioners listed in Clause 5.

For water-cooled systems, the reference testing conditions at full load are presented in the relevant reference testing standards for each type of air conditioner.

Table 2 –Reference testing conditions at full load				
Testing conditions	Indoor section		Outdoor section	
	Dry-Bulb ^{o}C	Wet-Bulb ^{o}C (when applicable)	Dry-Bulb ^{o}C	Wet-Bulb ^{o}C (when applicable)
Temperature T1	27.0	19.0	35.0	24.0
Temperature T3	29.0	19.0	46.0	24.0

4.3 Maximum cooling performance test (operability at 52 ^{o}C)

4.3.1 Scope for the test of operability at 52 ^{o}C

The test is applicable to air-cooled air conditioners covered by Clause 5

Note: If not described in the reference standards listed in Clause 5 and applicable to the tested product the following procedure applies

4.3.2 Temperature conditions

Temperature conditions shall be set as presented in Table 3.

Table 3 –Reference testing conditions of operability at 52 ^{o}C				
Testing conditions	Indoor section		Outdoor section	
	Dry-Bulb ^{o}C	Wet-Bulb ^{o}C (when applicable)	Dry-Bulb ^{o}C	Wet-Bulb ^{o}C (when applicable)
Operability at 52 ^{o}C	32	23	52.0	31.0

4.3.3 Procedure and measurements

- Equipment shall be operated continuously for one hours at the temperature conditions and voltage(s) specified.
- All power to the equipment shall be interrupted for a minimum period of five seconds and a maximum period of seven seconds and then be restored.
- The unit shall resume continuous operation within one hour of restoration of power and shall then operate continuously for one hour. Operation and resetting of safety devices prior to establishment of continuous operation is permitted.
- Air volume rate is based on specification from manufacturer.
- When relevant, the external static pressure shall be greater than or equal to the minimum external static pressure defined for the measurements at T1, as described in the corresponding standard per type of units as presented in Clause 5.

The average cooling capacity of the units during the test shall be reported.

4.3.4 Tolerances for high temperature operating test

The tolerance for outdoor temperature is ±0.6 ^{o}C.

4.4 Reference test conditions and calculation method for partial load operation

- For Seasonal Energy Efficiency Ratio (SEER), testing conditions mentioned in the reference testing standards listed in Clause 5 shall be applied. In order to calculate the Seasonal Energy Efficiency Ratio (SEER) value, clauses 5.3.1, 8.2 and 8.3 mentioned in SASO2663 shall be applied.

- For Integrated Part Load Value (IPLV), Integrated Energy Efficiency Ratio (IEER) and Seasonal Energy Efficiency Ratio in active mode ($SEER_{on}$), testing conditions and calculation method mentioned in the reference testing standards listed in Clause 5 shall be applied.

4.5 Declaration of the rated cooling capacity

When the declaration of the rated cooling capacity CC_{rated} is expressed in terms of Btu/h Table 4 shall be applied.

Table 4 - Rules to express the rated cooling capacity.

Rated cooling capacity (Btu/h)	Multiples (Btu/h)
CC_{rated} <20,000	100
20,000 ≤ CC_{rated} <38,000	200
38,000 ≤ CC_{rated} ≤65,000	500
65,000 < CC_{rated} <135,000	1,000
135,000 ≤ CC_{rated} <400,000	2,000
400,000 ≤ CC_{rated}	5,000

4.6 Declaration of the rated EER, SEER, $SEER_{on}$, IEER, IPLV and NsensCOP

Values of energy efficiency, whenever published, shall be expressed as presented below:

- For the rated EER ,SEER and $SEER_{on}$, multiples of the nearest 0.05 Btu/(W.h).
- For the rated IEER and IPLV, multiples of the nearest 0.1 Btu/(W.h).
- For the rated NsensCOP, multiples of the nearest 0.01 (W/W).

5. MINIMUM ENERGY PERFORMANCE STANDARD (MEPS)

The Minimum Energy Performance Standard (MEPS) requirements, presented in Tables 5 through 12, are based on the rated EER or NsensCOP at:

- T1 testing conditions mentioned in Table 2 for air-cooled air conditioner types.
- Testing conditions mentioned in the reference testing standard for all other air conditioner types.

6. PARTIAL LOAD RATING

Air conditioners within the scope of this standard shall submit the Partial Load Rating as presented in Tables 5 through 10 as applicable.

Table 5 – MEPS for electrically operated unitary air conditioning[1]				
Air conditioner type	**Rated cooling capacity (Btu/h)**	**MEPS Rated EER at T1 (Btu/W.h)**	**Reference testing standards**	
			AHRI 340/360	**SASO ISO 5151 / SASO ISO 13253**
			Partial Load Rating	
Air conditioners, air cooled	≤ 65,000	11.2	N/A	SEER
	> 65,000 and < 135,000	11.2	IEER	SEER
	≥ 135,000 and < 240,000	11.0		
	≥ 240,000 and < 760,000	10.0		
	≥ 760,000	9.7		
Air conditioners, water cooled	≤ 65,000	12.1	IEER	N/A
	> 65,000 and < 135,000	12.1		
	≥ 135,000 and < 240,000	12.5		
	≥ 240,000 and < 760,000	12.4		
	≥ 760,000	12.2		
Air conditioners, evaporatively cooled	≤ 65,000	12.1	IEER	
	> 65,000 and < 135,000	12.1		
	≥ 135,000 and < 240,000	12.0		
	≥ 240,000 and < 760,000	11.9		
	≥ 760,000	11.7		

[1] Values apply when the unit has no heating section or when the heating section is electrical resistance type, for all other type deduct 0.2 from the MEPS values

Table 6 – MEPS for electrically operated unitary heat pump[1]				
Air conditioner type	**Rated cooling capacity (Btu/h)**	**MEPS** **Rated EER at T1 (Btu/W.h)**	**Reference testing standards**	
			AHRI 340/360	**SASO ISO 5151 / SASO ISO 13253**
			Partial Load Rating	
Air cooled (cooling mode)	≤ 65,000	11.0	N/A	SEER
	> 65,000 and < 135,000	11.0	IEER	SEER
	≥ 135,000 and < 240,000	10.6		
	≥ 240,000	9.5		

[1] Values apply when the unit has no heating section or when the heating section is electrical resistance type, for all other type deduct 0.2 from the MEPS values.

Table 7 – MEPS for condensing units				
Air Conditioner Type	**Rated cooling capacity (Btu/h)**	**Reference testing standards**	**MEPS Rated EER at T1 (Btu/W.h)**	**Partial Load Rating**
Condensing units, air cooled	≥ 135,000	AHRI 365	10.5	IEER
Condensing units, water cooled		AHRI 365	13.5	
Condensing units, evaporatively cooled		AHRI 365	13.5	

Table 8 – MEPS for chillers				
Air Conditioner Type	**Rated cooling capacity (Btu/h)**	**MEPS Rated EER at T1 (Btu/W.h)**	**Reference testing standards**	
			AHRI 550/590	**EN 14511 & EN 14825**
			Partial Load Rating	
Air-cooled chillers	< 1,800,000	9.7	IPLV	$SEER_{on}$
	≥ 1,800,000	9.7		
Water-cooled electrically operated, positive displacement	< 900,000	15.4		
	≥ 900,000 and < 1,800,000	16.0		
	≥ 1,800,000 and < 3,600,000	17.7		
	≥ 3,600,000 and < 7,200,000	19.2		
	≥ 7,200,000	20.5		
Water-cooled electrically operated, centrifugal[1]	< 1,800,000	17.3		
	≥ 1,800,000 and < 3,600,000	18.9		
	≥ 3,600,000 and < 4,800,000	20.2		
	≥ 4,800,000 and < 7,200,000	20.5		
	≥ 7,200,000	20.5		

[1] Use of the Kadj factor expressed in ASHRAE 90.1 Clause 6.4.1.2.1 is allowed for determination of the rated EER at T1 conditions.

Table 9 – MEPS for absorption chillers				
Air Conditioner Type	**Rated cooling capacity (Btu/h)**	**Reference testing standards**	**MEPS Rated EER at T1 (Btu/W.h)**	**Partial Load Rating**
Water-cooled absorption, single effect	All capacities	AHRI 560	2.4	N/A
Absorption double effect, indirect fired	All capacities		3.4	IPLV
Absorption double effect, direct fired	All capacities		3.4	

Table 10 – MEPS for electrically operated variable refrigerant flow (VRF) and applied heat pumps[1]					
Air Conditioner Type	**Rated cooling capacity (Btu/h)**	**Reference testing standards**			
		AHRI 1230		**ISO 15042**	
		MEPS Rated EER at T1 (Btu/W.h)	**Partial Load Rating**	**MEPS Rated EER at T1 (Btu/W.h)**	**Partial Load Rating**
VRF multi split air conditioners, air cooled	≤ 65,000	N/A		11.2	SEER
	> 65,000 and ≤ 135,000	10.5	IEER	11.2	SEER
	> 135,000 and ≤ 240,000	10.3		11.0	
	> 240,000	9.5		10.0	
VRF multi split heat pumps, air cooled (cooling mode)	≤ 65,000	N/A		11.2	SEER
	> 65,000 and ≤ 135,000	10.3	IEER	11.0	SEER
	> 135,000 and ≤ 240,000	9.9		10.6	
	> 240,000	9.1		9.5	
VRF multi split air conditioners, water cooled	≤ 65,000	12.0	IEER	N/A	
	> 65,000 and ≤ 135,000	12.0			
	> 135,000 and ≤ 240,000	10.0			
	> 240,000	10.0			

[1] For system with heat recovery, deduct 0.2 from MEPS values.

Table 11 – MEPS for floor-mounted A/C and condensing units serving computer room					
Air Conditioner Type	**Standard Model**	**Net Sensible Cooling Capacity (Btu/h)**	**MEPS Rated NsensCOP (W/W)**	**Rating Conditions Return Air (dry-bulb/dew-point)**	**Reference testing standards**
Air cooled	**Downflow**	< 80,000	2.70	29.5 ºC / 11 ºC (Class 2)	AHRI 1360
		≥ 80,000 and < 295,000	2.58		
		≥ 295,000	2.36		
	Upflow-ducted	< 80,000	2.67		
		≥ 80,000 and < 295,000	2.55		
		≥ 295,000	2.33		
	Upflow-nonducted	< 65,000	2.16	24 ºC / 11 ºC (Class 1)	
		≥ 65,000 and < 240,000	2.04		
		≥ 240,000	1.89		
	Horizontal	< 65,000	2.65	35 ºC / 11 ºC (Class 3)	
		≥ 65,000 and < 240,000	2.55		
		≥ 240,000	2.47		
Air cooled with fluid economizer	**Downflow**	< 80,000	2.70	29.5 ºC / 11 ºC (Class 2)	AHRI 1360
		≥ 80,000 and < 295,000	2.58		
		≥ 295,000	2.36		
	Upflow-ducted	< 80,000	2.67		
		≥ 80,000 and < 295,000	2.55		
		≥ 295,000	2.33		
	Upflow-nonducted	< 65,000	2.09	24 ºC / 11 ºC (Class 1)	
		≥ 65,000 and < 240,000	1.99		
		≥ 240,000	1.81		
	Horizontal	< 65,000	2.65	35 ºC / 11 ºC (Class 3)	
		≥ 65,000 and < 240,000	2.55		

		≥ 240,000	2.47		
Water cooled	**Downflow**	< 80,000	2.82	29.5 ºC / 11 ºC (Class 2)	AHRI 1360
		≥ 80,000 and < 295,000	2.73		
		≥ 295,000	2.67		
	Upflow-ducted	< 80,000	2.79		
		≥ 80,000 and < 295,000	2.70		
		≥ 295,000	2.64		
	Upflow-nonducted	< 65,000	2.43	24 ºC / 11 ºC (Class 1)	
		≥ 65,000 and < 240,000	2.32		
		≥ 240,000	2.20		
	Horizontal	< 65,000	2.79	35 ºC / 11 ºC (Class 3)	
		≥ 65,000 and < 240,000	2.68		
		≥ 240,000	2.6		
Water cooled with fluid economizer	**Downflow**	< 80,000	2.77	29.5 ºC / 11 ºC (Class 2)	AHRI 1360
		≥ 80,000 and < 295,000	2.68		
		≥ 295,000	2.61		
	Upflow-ducted	< 80,000	2.74		
		≥ 80,000 and < 295,000	2.65		
		≥ 295,000	2.58		
	Upflow-nonducted	< 65,000	2.35	24 ºC / 11 ºC (Class 1)	
		≥ 65,000 and < 240,000	2.24		
		≥ 240,000	2.12		
	Horizontal	< 65,000	2.71	35 ºC / 11 ºC (Class 3)	
		≥ 65,000 and < 240,000	2.60		
		≥ 240,000	2.54		

Glycol cooled	**Downflow**	< 80,000	2.56	29.5 ºC / 11 ºC (Class 2)	AHRI 1360
		≥ 80,000 and < 295,000	2.24		
		≥ 295,000	2.21		
	Upflow-ducted	< 80,000	2.53		
		≥ 80,000 and < 295,000	2.21		
		≥ 295,000	2.18		
	Upflow-nonducted	< 65,000	2.08	24 ºC / 11 ºC (Class 1)	
		≥ 65,000 and < 240,000	1.90		
		≥ 240,000	1.81		
	Horizontal	< 65,000	2.48	35 ºC / 11 ºC (Class 3)	
		≥ 65,000 and < 240,000	2.18		
		≥ 240,000	2.18		
Glycol cooled with fluid economizer	**Downflow**	< 80,000	2.51	29.5 ºC / 11 ºC (Class 2)	AHRI 1360
		≥ 80,000 and < 295,000	2.19		
		≥ 295,000	2.15		
	Upflow-ducted	< 80,000	2.48		
		≥ 80,000 and < 295,000	2.16		
		≥ 295,000	2.12		
	Upflow-nonducted	< 65,000	2.00	24 ºC / 11 ºC (Class 1)	
		≥ 65,000 and < 240,000	1.82		
		≥ 240,000	1.73		
	Horizontal	< 65,000	2.44	35 ºC / 11 ºC (Class 3)	
		≥ 65,000 and < 240,000	2.10		
		≥ 240,000	2.10		

Table 12 – MEPS for ceiling-mounted computer room A/C					
Air Conditioner Type	**Standard Model**	**Net Sensible Cooling Capacity (Btu/h)**	**MEPS Rated NsensCOP (W/W)**	**Rating Conditions Return Air (dry-bulb/dew-point)**	**Testing method**
Air cooled with free air discharge condenser	**Ducted**	< 29,000	2.05	24 ºC / 11 ºC (Class 1)	AHRI 1360
		≥ 29,000 and < 65,000	2.02		
		≥ 65,000	1.92		
	Nonducted	< 29,000	2.08		
		≥ 29,000 and < 65,000	2.05		
		≥ 65,000	1.94		
Air cooled with free air discharge condenser with fluid economizer	**Ducted**	< 29,000	2.01	24 ºC / 11 ºC (Class 1)	AHRI 1360
		≥ 29,000 and < 65,000	1.97		
		≥ 65,000	1.87		
	Nonducted	< 29,000	2.04		
		≥ 29,000 and < 65,000	2.00		
		≥ 65,000	1.89		
Air cooled with ducted condenser	**Ducted**	< 29,000	1.86	24 ºC / 11 ºC (Class 1)	AHRI 1360
		≥ 29,000 and < 65,000	1.83		
		≥ 65,000	1.73		
	Nonducted	< 29,000	1.89		
		≥ 29,000 and < 65,000	1.86		
		≥ 65,000	1.75		
Air cooled with fluid economizer and ducted condenser	**Ducted**	< 29,000	1.82	24 ºC / 11 ºC (Class 1)	AHRI 1360
		≥ 29,000 and < 65,000	1.78		
		≥ 65,000	1.68		

	Nonducted	< 29,000	1.85		
		≥ 29,000 and < 65,000	1.81		
		≥ 65,000	1.70		
Water cooled	**Ducted**	< 29,000	2.38	24 ºC / 11 ºC (Class 1)	AHRI 1360
		≥ 29,000 and < 65,000	2.28		
		≥ 65,000	2.18		
	Nonducted	< 29,000	2.41		
		≥ 29,000 and < 65,000	2.31		
		≥ 65,000	2.20		
Water cooled with fluid economizer	**Ducted**	< 29,000	2.33	24 ºC / 11 ºC (Class 1)	AHRI 1360
		≥ 29,000 and < 65,000	2.23		
		≥ 65,000	2.13		
	Nonducted	< 29,000	2.36		
		≥ 29,000 and < 65,000	2.26		
		≥ 65,000	2.16		
Glycol cooled	**Ducted**	< 29,000	1.97	24 ºC / 11 ºC (Class 1)	AHRI 1360
		≥ 29,000 and < 65,000	1.93		
		≥ 65,000	1.78		
	Nonducted	< 29,000	2.00		
		≥ 29,000 and < 65,000	1.98		
		≥ 65,000	1.81		
Glycol cooled with fluid economizer	**Ducted**	< 29,000	1.92	24 ºC / 11 ºC (Class 1)	AHRI 1360
		≥ 29,000 and < 65,000	1.88		
		≥ 65,000	1.73		
	Nonducted	< 29,000	1.95		
		≥ 29,000 and < 65,000	1.93		
		≥ 65,000	1.76		

7. CRITERIA FOR ACCEPTABILITY OF PRODUCTS AT REGISTRATION AND MARKET SURVEILLANCE

The tested values shall be accepted if they meet the following criteria, as applicable:

a) Tested power…… ≤ 1.05 x rated power.
b) Tested cooling capacity ……≥ 0.95 x rated capacity.
c) Tested EER (or NsensCOP) ……..…….. ≥ MEPS.
d) Tested EER (or NsensCOP) ……. ≥ 0.95 x rated EER (or Rated NsensCOP)
e) Tested IEER ……..……..……..≥ 0.90 x rated IEER
f) Tested IPLV ……..……..……..≥ 0.90 x rated IPLV
g) Tested SEER ……..……..……..…..≥ 0.90 x rated SEER
h) Tested $SEER_{on}$ ……..……..……..≥ 0.90 x rated $SEER_{on}$
i) Tested voltage according to clause 4.1
j) Tested Frequency according to clause 4.1

8. MARKING AND INSTRUCTIONS

8.1 General

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 on any part of the air conditioner unit or packaging shall not have any ambiguity or lead to misunderstanding of the performance of the unit.

8.2 Information on the nameplate

The information on the nameplate shall include as a minimum:

- Manufacturer's name and/or trademark
- Year and month of manufacturing.
- Country of origin.
- Manufacturer's model or type reference and serial number of the unit.
- Rated voltage or rated voltage range in volts (V).
- Rated frequency in hertz (Hz).
- For each of cooling and heating test conditions as per the relevant reference testing standard (If applicable):

a) Rated current in amperes (A).
b) Rated power input in Watt (W) or kilowatts (kW).
c) Rated cooling capacity in Btu/h or kW, tons or kW for Chillers only.
d) Rated heating capacity in Btu/h or kW.
e) Rated Energy Efficiency Ratio (EER) in Btu/(W.h).
f) Rated Net Sensible Coefficient of Performance (NSensCOP) in (W/W).
g) Refrigerant used and mass of refrigerant charge in kg.

8.3 Instruction sheet
An instruction sheet in both Arabic and English shall be delivered with each air conditioner. Tables, drawings, and circuit diagrams may be depicted in English only.

In addition, a manual in Arabic or English or both shall be delivered with each air conditioner.

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

- The information specified in clause 8.2.
- 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.
- Instructions on unit handling and rigging.
- Weight of the unit, both the net and the gross.
- Refrigeration charging instructions, including charging and discharging refrigerant.

8.4 Additional submittals
In case of air conditioners required to provide a partial load SEER rating, the AC settings for full load, half load and minimum load operation, shall be submitted, as applicable, through the registration system electronically via SASO website.

9. REGISTRATION REQUIREMENTS
Product registration is mandatory, whereby information about registration requirements are available in the Saudi Standards, Metrology, and Quality Organization (SASO) website.

In order to issue a valid energy efficiency certificate, The applicant should fulfill all updated regulations, requirements and procedures required by SASO through the certification scheme of large capacity air conditioners.