وزارة الصناعة والتجارة

قرار رقم (٧٩) لسنة ٢٠٢٣
بإصدار اللائحة الفنية الوطنية لكفاءة الطاقة
لأجهزة التكييف ذات السعة الكبيرة

وزير الصناعة والتجارة:

بعد الاطلاع على القانون رقم (٩) لسنة ٢٠١٦ بشأن المواصفات والمقاييس،

وعلى اللائحة التنفيذية للقانون رقم (٩) لسنة ٢٠١٦ بشأن المواصفات والمقاييس الصادرة بالقرار رقم (١٥٥) لسنة ٢٠١٧،

وعلى قرار اللجنة الوطنية للمواصفات والمقاييس في اجتماعها الخامس والخمسين المنعقد بتاريخ ٥ أبريل ٢٠٢٣ بالموافقة على اعتماد اللائحة الفنية الوطنية لكفاءة الطاقة لأجهزة التكييف ذات السعة الكبيرة،

وبناءً على عرض وكيل الوزارة،

قُرِّر الآتي:

المادة الأولى

يُعمل بأحكام اللائحة الفنية الوطنية لكفاءة الطاقة لأجهزة التكييف ذات السعة الكبيرة المرافقة لهذا القرار.

المادة الثانية

على وكيل الوزارة والمعنيين – كلٌّ فيما يخصه – تنفيذ أحكام هذا القرار، ويُعمل به بعد ثمانية عشر شهراً من تاريخ نشره في الجريدة الرسمية.

وزير الصناعة والتجارة
عبدالله بن عادل فخرو

صدر بتاريخ: ١٦ ربيع الآخر ١٤٤٥هـ
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Kingdom of Bahrain Technical Regulation on Commercial Air-Conditioners

Minimum Energy Performance Requirements And Testing Requirements

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Kingdom of Bahrain Technical Regulation on Commercial Air-Conditioners

Minimum Energy Performance Requirements And Testing Requirements

1. Scope

This Regulation specifies the Minimum Energy Performance Standard (MEPS) and testing requirements for Air-Conditioners with nominal capacity more than 65,000 Btu/h of the following main product categories:

- Electrically operated Air-Conditioners
- Condensing units
- Chillers
- Absorption chillers
- Electrically operated variable refrigerant flow (VRF) Air-Conditioners
- Close control Air-Conditioners and condensing units serving computer rooms

It shall apply to Air-Conditioners designed to operate in AC single-phase circuits and three-phase circuits. Air-Conditioners having special voltages, not under the scope of this regulation in condition that they do not exceed 600 V.

For water-cooled chillers voltages up to 15000 V are included.

Product categories, capacities, and applicable testing standards falling under the scope of this Regulation are detailed in clause 5.

1.1 Exclusions

This Regulation does not apply to Air-Conditioners that are covered under the scope of the Ministerial order no. 70 for 2015.

2. Normative references

The following normative reference standards apply. For undated references the latest apply. In addition this Regulation supersedes the below reference standards in case of conflicting requirements.

- AHRI 1361 (SI/2017), Performance Rating of Computer and Data Processing Room Air-Conditioners
- AHRI 551/591 (SI/2015): Performance Rating of Water-chilling and Heat Pump Water-heating Packages Using the Vapor Compression Cycle (with Addendum 1)
- ANSI/AHRI 210/240: “Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment”.
- ANSI/AHRI 340/360: “Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment”.
- ANSI/AHRI 365(I-P):“Commercial and Industrial Unitary Air-Conditioning Condensing Units”.
- ANSI/AHRI 366 (SI/2009): Commercial and Industrial Unitary Air-Conditioning Condensing Units
- ANSI/AHRI 550/590(I-P): “Performance Rating of Water-Chilling and Heat Pump Water-Heating Packages Using the Vapor Compression Cycle”.
- AHRI 560 (2000): Absorption Water Chilling and Water Heating Packages
- ANSI/AHRI 1230: “Performance Rating of Variable Refrigerant Flow (VRF) Multi-Split Air-Conditioning and Heat Pump Equipment”.
- ANSI/AHRI 1360 (I-P): Performance Rating of Computer and Data Processing Room Air-Conditioners
- ASHRAE 90.1:2013 : Energy standard for Buildings Except Low-Rise Residential Buildings
- GSO 1899 "GCC Standard Voltages and Frequencies for Alternating Current Distribution Systems".
- ISO 5151 (2010): Non-ducted Air-Conditioners and heat pumps — Testing and rating for performance
- ISO 13253 (2011): Ducted air-conditioners and air to air heat pumps – Testing and rating for performance
- ISO 15042 (2011): Multiple split-system Air-Conditioners and air to air heat pumps – Testing and rating for performance
- ISO13256-1 (2007): Water-source heat pumps – Testing and rating for performance – Part 1 – Water to air and brine to air heat pumps
- ISO13256-2 (2007): Water-source heat pumps – Testing and rating for performance – Part 2 – Water to water and brine to water heat pumps

3. Terms and Definitions

For the purposes of this Regulation, 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 reconcentrations of an absorbent solution. The reconcentrations 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 two steps reconcentrations 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 Accredited laboratory

Any laboratory recognized by National Standard Body or/and recognized through the ILAC system for the list of testing procedures listed in this regulation

3.3 Adjustment factor (Kadj)

Factor used to adapt the performance of air-conditioners not designed for operation at testing conditions.

Note: For centrifugal chillers ASHRAE 901:2013 clause 6.4.1.2.1 is a recognized method to calculate such a factor.

3.4 Basic Model Group (BMG)

A BMG is a set of models that share characteristics which allow the performance of one (1) model to be generally representative of the performance of other models within the group. This group of products does not necessarily have to share discrete performance. The Product Specific Operations Manual specifies the exact product features that define a BMG.

Example: A basic model group of commercial boilers is a set of models that range in size, but are of similar type, design, and construction. A basic model group would consist of boilers that are:

- Constructed of the same material (i.e. aluminum, cast iron, or steel);
- Have the same control mechanism (i.e. condensing, modulating, pressure fired, power burner, natural draft, etc.);

- Have the same vent size; and have the same energy input capacity.

Example: A basic model group of residential air-conditioning systems consists of outdoor units (which have same condenser, outdoor coil surface area, and outdoor air volume flowrate) that are paired with specific indoor models (coils)

Note: Use of Basic Model Group applies to PATH A only.

3.5 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 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

3.6 Close Control Air-Conditioners and Condensing Units Serving Computer Rooms

A Computer and Data Processing Room (CPDR) Air Conditioner consisting of one or more factory-made assemblies, which include a direct expansion evaporator or chilled water cooling coil, an air-moving device(s), and air-filtering device(s). The air conditioner may include a compressor, condenser, humidifier, or reheating function. The functions of a CDPR, either alone or in combination with a cooling plant, are to provide air filtration, air circulation, cooling, and humidity control (if the necessary options are included).

3.7 Condenser

A refrigeration system component which condenses refrigerant vapor at constant saturation pressure. De-superheating and sub-cooling of the refrigerant may occur as well.

3.7.1 Air-Cooled Condenser

A component which condenses refrigerant vapor by rejecting heat to air that is mechanically circulated over its heat transfer surface, causing a rise in the air temperature.

3.7.2 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.

3.7.3 Water-Cooled Condenser

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

3.8 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.

3.9 Ducted Air-Conditioners

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

3.10 Electrically Operated Unitary ACs

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 regulation shall be based upon the use of matched assemblies. These assemblies are electrically operated, vapor compression refrigeration systems.

3.11 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.

3.12 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.

3.13 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.

3.14 Modular Unit

A Modular Unit is a unit that is made up of multiple units that can function individually or as a single unit. Modular units shall be certified, provided that the unit is rated and listed in the AHRI certification directory as a complete unit with a specific combination of modules and with a total capacity that is within the scope of the program. In this case, the complete Modular Unit consisting of multiple modules must be certified as a single complete unit as part of the certification program**.**

Note: unit can be chiller, condenser or other product within the scope of this document.

3.15 Multiple split Air-Conditioners and Heat pump (or Multi-split or multi split Air-Conditioners and heat pumps

Split system that has one outdoor unit and two or more Indoor units and/or blower coil indoor units connected with a single refrigerant circuit. The indoor units operate independently and can condition multiple zones in response to at least two indoor thermostats or temperature sensors. The outdoor unit operates in response to independent operation of the indoor units based on control input of multiple indoor thermostats or temperature sensors, and/or refrigeration circuits sensor input (e.g. suction pressure).

3.16 Net sensible cooling capacity
The total gross cooling capacity less the latent cooling less the energy to the air movement.

3.17 Net Sensible Coefficient of Performance (NSenCOP)
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.

3.18 Non-ducted air conditioner
An air conditioner or heat pump that is designed to be permanently installed and directly heats or cools air within the conditioned space using one or more indoor coils that are mounted on room walls and/or ceilings. The unit may be of a modular design that allows for combining multiple outdoor coils and compressors to create one overall system.

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

3.20 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.

3.21 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.

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

3.23 Registration system:
As per the national registration procedure implemented by Kingdom of Bahrain.

3.24 Sensible coefficient of performance (NsensCOP)
A ratio calculated by dividing the net sensible cooling capacity in watts by the total power input in watt (excluding re-heaters and humidifiers) at conditions detailed in the relevant testing standard. The net sensible cooling capacity minus the energy dissipated into the cooled space by the fans system**.**

3.25 Split system
Any air conditioner that has at least two separate assemblies that are connected with refrigerant piping when installed. One of these assemblies includes an indoor coil that exchanges heat with the indoor air to provide heating or cooling, while one of the others includes an outdoor coil that exchanges heat with the outdoor air. Split Systems may be either blower coil systems or coil-only systems.

3.26 "Shall" or "Should":
"Shall" or "should" shall be interpreted as follows:

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

3.26.2 Should
“Should” is used to indicate provisions which are desirable as good practice, but are not mandatory.

3.27 VRF multiple air to air - air split system
A VRF system air-conditioner or VRF Heat Pump with one or more manifolded Outdoor Units that have air-to-air heat exchangers.

3.28 VRF heat recovery multiple split system
VRF air-to-air Heat Pump or VRF Water Source Heat Pump that is capable of providing simultaneous heating and cooling operation, 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.

3.29 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 may or may not be an integral part of the package.

4. Testing Requirements

4.1 Reference test conditions

The reference testing conditions are presented in Table 1.

Tests are performed according to the relevant AHRI or ISO standards corresponding to the type of Air-Conditioners listed in Clause 5.

All units shall be tested according to Table 1

For water cooled system, the testing conditions are presented in the relevant standards for each type of air-conditioners.

In addition, the operability shall be checked at 52^{o}C for two continuous hours according to AHRI or ISO standards as applicable.

The Minimum Energy Performance Standard (MEPS) requirements in the scope of this Regulation are based on temperature testing considering T1 or T3 testing conditions mentioned in Table 1

Table 1 REFERENCE TESTING CONDITIONS

TESTING CONDITION	INDOOR SECTION		OUTDOOR SECTION	
	Dry-Bulb °C [°F]	Wet-Bulb when applicable °C [°F]	Dry-Bulb °C [°F]	Wet-Bulb when applicable °C [°F]
T1	27.0 [80.6]	19.0 [66.2]	35.0 [95.0]	24.0 [75.2]
T3	29.0 [84.2]	19.0 [66.2]	46.0 [114.8]	24.0 [75.2]
OPERABILITY AT 52 °C [125.6 °F]	26.7 [80.0]	19.4 [67.0]	52.0 [125.6]	31.0 [87.8]
Test Frequency*	Rated Frequency			
Test Voltage	See Table4			
*: for equipment with dual rated frequencies (50-60 Hz), it shall be tested according to GSO1899.				

For computers room and data processing Air-Conditioners, MEPS and temperature conditions are defined in Table 9.

Products are tested under the rated voltage and rated frequency applicable according to GSO1899.

For tests, the rated voltage as per clause 5 applies; if rated voltage is not mentioned in the testing standards, refer to Table 2

Table 2 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.

For voltages over 600 V and up to 15000 V, admissible tested voltage is presented in each relevant standard.

4.2 Declaration of the rated cooling capacity

The declaration of the rated cooling capacity CC_{rated} shall be expressed only in terms of Btu/h as shown in Table 3.

Table 3 RESOLUTION FOR EXPRESSING THE RATED COOLING CAPACITY

Rated cooling capacity (Btu/h)	Multiples
CC_{rated} <20,000 [5.86 kW]	100 (Btu/h) or 30 (W)
20,000 [5.86 kW] ≤ CC_{rated} <38,000 [11.13 kW]	200 (Btu/h) or 60 (W)
38,000 [11.13 kW] ≤ CC_{rated} <65,000 [19.05 kW]	500 (Btu/h) or 150 (W)
65,000 [19.05 kW] ≤ CC_{rated} <135,000 [39.56 kW]	1,000 (Btu/h) or 300 (W)
135,000 [39.56 kW] ≤ CC_{rated} <400,000 [117.20 kW]	2,000 (Btu/h) or 500 (W)
CC_{rated} ≥ 400,000 [117.20 kW]	5,000 (Btu/h) or 1000 (W)

4.3 Declaration of the rated Energy Efficiency Ratio or Coefficient of Performance

Standard measures of energy efficiency, whenever published, shall be expressed in multiples of the nearest 0.05 Btu/(W·h) for the rated EER or in multiples of the nearest 0.01 (W/W) for the rated net sensible COP (NsensCOP), or in multiples of the nearest 0.05 kW/RT.

5. Minimum Energy Performance Standard (MEPS)

5.1 Applicable values for MEPS

MEPS for Air-Conditioners within the scope of this regulation are presented in Tables 4 through 9.

The MEPS are established from the rated values. Conditions for acceptability of the tested values used to confirm the rated values are presented in Clause 6.

For convenience, the cooling capacities are expressed in Btu/h and in kW using a conversion factor of 1000 Btu/h equal to 0.293 kW

5.2 MEPS for Electrically operated Unitary Air-Conditioners

Table 4 MEPS for electrically operated Air-Conditioners (Unitary Air Conditioning Equipment)1,2

Air Conditioner / Appliance Type	Rated cooling capacity (Btu/h) [kW]	Testing method	EER (T1) (Btu/W.h)	EER (T3) (Btu/W.h)
Air-Conditioners, air cooled	≤ 65,000 [19.05 kW] (excluding window, split ducted, and split non-ducted)	ANSI/AHRI 210/240 or ISO 5151 or ISO 13253	11.2	8.1
	> 65,000 [19.05 kW] and ≤ 135,000 [39.56 kW]	ANSI/AHRI 340/360 Or ISO 5151 Or ISO 13253	11.2	8.1
	> 135,000 [39.56 kW] and ≤ 240,000 [70.32 kW]		11.0	8.0
	> 240,000 [70.32 kW] and ≤ 760,000 [222.68 kW]		10.0	7.2
	> 760,000 [222.68 kW]		9.7	7.0
Air-Conditioners, water cooled	≤ 65,000 [19.05 kW]	ANSI/AHRI 210/240 Or ISO 13256-1	12.1	-
	> 65,000 [19.05 kW] and ≤ 135,000 [39.56 kW]	ANSI/AHRI 340/360 Or ISO 13256-1	12.1	-
	> 135,000 [39.56 kW] and ≤ 240,000 [70.32 kW]		12.5	-
	> 240,000 [70.32 kW] and ≤ 760,000 [222.68 kW]		12.4	-
	> 760,000 [222.68 kW]		12.2	-
Air-Conditioners, evaporatively cooled	≤ 65,000 [19.05 kW]	ANSI/AHRI 210/240	12.1	8.7
	> 65,000 [19.05 kW] and ≤ 135,000 [39.56 kW]	ANSI/AHRI 340/360	12.1	8.7
	> 135,000 [39.56 kW] and ≤ 240,000 [70.32 kW]	ANSI/AHRI 340/360	12.0	8.6
	> 240,000 [70.32 kW] and ≤ 760,000 [222.68 kW]	ANSI/AHRI 340/360	11.9	8.6

Air Conditioner / Appliance Type	Rated cooling capacity (Btu/h) [kW]	Testing method	EER (T1) (Btu/W.h)	EER (T3) (Btu/W.h)
	> 760,000 [222.68 kW]	ANSI/AHRI 340/360	11.7	8.4

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

[2] For systems with heat recovery, deduct 0.2 from the EER values

5.3 MEPS for Condensing units

Table 5 MEPS for condensing units

Air Conditioner Appliance Type	Rated cooling capacity (Btu/h) [kW]	Testing methods	EER (T1) (Btu/W.h)	EER (T3) (Btu/W.h)
Condensing units, air cooled	≤ 135,000 [39.56 kW]	ANSI/AHRI 210/240 ANSI/AHRI 340/360	11.0	7.9
Condensing units, air cooled	> 135,000 [39.56 kW]	ANSI/AHRI 365	10.5	7.6
Condensing units, water cooled	≤ 135,000 [39.56 kW]	ANSI/ANSI/AHRI 340/360	11.9	-
Condensing units, water cooled	> 135,000 [39.56 kW]	ANSI/AHRI 365	13.5	-
Condensing units, evaporatively cooled	≤ 135,000 [39.56 kW]	ANSI/AHRI 340/360	11.9	8.6
Condensing units, evaporatively cooled	> 135,000 [39.56 kW]	ANSI/AHRI 365	13.5	9.7

5.4 MEPS for Chillers

Table 6 MEPS for chillers

Air Conditioner Appliance Type	Rated cooling capacity (Btu/h) [kW][1]	Testing methods	EER (T1) [2] (Btu/W.h)
Air-cooled chillers	≤ 1,800,000 [527.40 kW]	ANSI/AHRI 550/590	9.7
	> 1,800,000 [527.40 kW]		9.7
Water-cooled electrically operated, positive displacement	≤ 900,000 [263.70 kW]	ANSI/AHRI 550/590 or ISO 13256-2	15.4
	> 900,000 [263.70 kW] and ≤ 1,800,000 [[527.40 kW]		16.0
	> 1,800,000 [527.40 kW] and ≤ 3,600,000 [1,054.80 kW]		17.7
	> 3,600,000 [1054.80 kW] and ≤ 7,200,000 [21,109.60 kW]		19.2
	> 7,200,000 [2,109.60 kW]		19.2
Water-cooled electrically operated, centrifugal (Kadj factor)	≤ 3,600,000 [1,054.80 kW]		17.3
	> 3,600,000 [1,054.80 kW] and ≤ 7,200,000 [2,109.60 kW]		20.5
	> 7,200,000 [2,109.60 kW] and ≤ 14,400,000 [4,219.20 kW]		20.5
	> 14,400,000 [4,219.20 kW]		20.5

[1] Expression of cooling capacity using TR units is accepted using conventional conversion of 1 TR = 12,000 Btu/h

[2] 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

5.5 MEPS for Absorption chillers

Table 7 MEPS for absorption chillers

Air Conditioner Appliance Type	Rated cooling capacity (Btu/h)	Testing methods	EER (T1) [1] (Btu/W.h)
Air-cooled absorption, single effect	All capacities	ANSI/AHRI 560	2.0
Water-cooled absorption, single effect	All capacities		2.4
Absorption double effect, indirect fired	All capacities		3.4
Absorption double effect, direct fired	All capacities		3.4

5.6 MEPS for Electrically operated variable-refrigerant-flow (VRF) air conditioner systems

Table 8 MEPS for Electrical operated variable refrigerant flow (VRF) air conditioner systems

Air Conditioner Appliance Type	Rated cooling capacity (Btu/h) [kW]	Testing methods	EER (T1) (Btu/W.h)
VRF multi split Air-Conditioners, air cooled	< 65,000 [19.05 kW]	ANSI/AHRI 1230 or ISO 15042	11.2
	≥ 65,000 [19.05 kW] and ≤ 135,000 [39.56 kW]		11.2
	> 135,000 [39.56 kW] and ≤ 240,000 [70.32 kW]		11.0
	> 240,000 [70.32 kW]		10.0
VRF multi split Air-Conditioners, heat pumps (1)	≤ 65,000 [19.05 kW]		11.2
	> 65,000 [19.05 kW] and ≤ 135,000 [39.56 kW]		11.0
	> 135,000 and ≤ 240,000 [70.32 kW]		10.6
	> 240,000 [70.32 kW]		9.5
VRF multi split Air-Conditioners, water cooled (1)	≤ 65,000 [19.05 kW]		12.0
	> 65,000 [19.05 kW] and ≤ 135,000 [39.56 kW]		12.0
	> 135,000 [39.56 kW] and ≤ 240,000 [70.32 kW]		10.0
	> 240,000 [70.32 kW]		10.0

5.7 MEPS for Close control Air-Conditioners and condensing units serving computer rooms

For this type of Air-Conditioners, the testing conditions are specified according to table 9, which supersedes Table 1.

Table 9 MEPS for Computer and Data Processing Room Air-Conditioners (as defined by clause 3)

Equipment Type	Net Sensible Cooling Capacity (Btu/h) [kW]	Standard Model	Minimum Net Sensible COP (NsensCOP)			Test Procedure
			Return Air Dry-Bulb Temperature/Dew-Point Temperature			
			Class 1	Class 2	Class 3	
			23.9°C / 11.1°C (75°F/5°2F)	29.4°C/ 11.1°C (85°F/52°F)	35°C / 11.1°C (95°F/52°F)	
Air Cooled	<65,000 [19.05 kW]	Down-Flow Unit		2.30		AHRI 1360
		Up-Flow Unit - Ducted		2.10		
		Up-Flow Unit – Non-Ducted	2.09			
		Horizontal-Flow Unit			2.45	
	≥65,000 [19.05 kW] and <240,000 [70.32 kW]	Down-Flow Unit		2.20		
		Up-Flow Unit - Ducted		2.05		
		Up-Flow Unit – Non-Ducted	1.99			
		Horizontal-Flow Unit			2.35	
	≥240,000 [70.32 kW]	Down-Flow Unit		2.00		
		Up-Flow Unit - Ducted		1.85		
		Up-Flow Unit – Non-Ducted	1.79			
		Horizontal-Flow Unit			2.15	
Water Cooled	<65,000 [19.05 kW]	Down-Flow Unit		2.50		AHRI 1360
		Up-Flow Unit - Ducted		2.30		
		Up-Flow Unit – Non-Ducted	2.25			
		Horizontal-Flow Unit			2.70	
	≥65,000 [19.05 kW] and <240,000 [70.32 kW]	Down-Flow Unit		2.40		
		Up-Flow Unit - Ducted		2.20		
		Up-Flow Unit – Non-Ducted	2.15			
		Horizontal-Flow Unit			2.60	
	≥240,000 [70.32 kW]	Down-Flow Unit		2.25		
		Up-Flow Unit - Ducted		2.10		
		Up-Flow Unit – Non-Ducted	2.05			
		Horizontal-Flow Unit			2.45	
Water Cooled with Fluid Economizer	<65,000 [19.05 kW]	Down-Flow Unit		2.45		AHRI 1360
		Up-Flow Unit - Ducted		2.25		
		Up-Flow Unit – Non-Ducted	2.20			
		Horizontal-Flow Unit			2.60	
	≥65,000	Down-Flow Unit		2.35		

Equipment Type	Net Sensible Cooling Capacity (Btu/h) [kW]	Standard Model	Minimum Net Sensible COP (NsensCOP)			Test Procedure
			Return Air Dry-Bulb Temperature/Dew-Point Temperature			
			Class 1	Class 2	Class 3	
			23.9°C / 11.1°C (75°F/5°2F)	29.4°C/ 11.1°C (85°F/52°F)	35°C / 11.1°C (95°F/52°F)	
	[19.05 kW] and <240,000 [70.32 kW]	Up-Flow Unit - Ducted		2.15		
		Up-Flow Unit – Non-Ducted	2.10			
		Horizontal-Flow Unit			2.55	
	≥240,000 [70.32 kW]	Down-Flow Unit		2.20		
		Up-Flow Unit - Ducted		2.05		
		Up-Flow Unit – Non-Ducted	2.00			
		Horizontal-Flow Unit			2.40	
Glycol Cooled	<65,000 [19.05 kW]	Down-Flow Unit		2.30		AHRI 1360
		Up-Flow Unit - Ducted		2.10		
		Up-Flow Unit – Non-Ducted	2.00			
		Horizontal-Flow Unit			2.40	
	≥ 65,000 [19.05 kW] and <240,000 [70.32 kW]	Down-Flow Unit		2.05		
		Up-Flow Unit - Ducted		1.85		
		Up-Flow Unit – Non-Ducted	1.85			
		Horizontal-Flow Unit			2.15	
	≥240,000 [70.32 kW]	Down-Flow Unit		1.95		
		Up-Flow Unit - Ducted		1.80		
		Up-Flow Unit – Non-Ducted	1.75			
		Horizontal-Flow Unit			2.10	
Glycol Cooled with Fluid Economizer	<65,000 [19.05 kW]	Down-Flow Unit		2.25		AHRI 1360
		Up-Flow Unit - Ducted		2.10		
		Up-Flow Unit – Non-Ducted	2.00			
		Horizontal-Flow Unit			2.35	
	≥ 65,000 [19.05 kW] and <240,000 [70.32 kW]	Down-Flow Unit		1.95		
		Up-Flow Unit - Ducted		1.80		
		Up-Flow Unit – Non-Ducted	1.75			
		Horizontal-Flow Unit		2.10		
	≥240,000 [70.32 kW]	Down-Flow Unit		1.90	2.10	
		Up-Flow Unit - Ducted		1.80		
		Up-Flow Unit – Non-Ducted	1.70			
		Horizontal-Flow Unit			2.10	

***5.8* Maximum Operating Temperature (52 ºC) Requirements**

This requirement is not applicable to water cooled and evaporatively cooled Air-Conditioners. During the test, the equipment shall operate continuously without interruption for any reasons during the duration of the tests.

5.8.1 Scope for the test of operability

If not described in the normative reference standard listed in Clause 2 and applicable to the tested product the following procedure applies. The test is applicable to Air-Conditioners covered in Clause 5 and if the condenser is air cooled.

5.8.2 Temperature Conditions

Temperature conditions shall be maintained as shown in Table 1.

5.8.3 Voltages

Tests shall be run at the unit's rated voltage according to Table 2.

5.8.4 Procedure and measurements

All power to the equipment shall be interrupted for a period sufficient to cause the compressor to stop (not to exceed 5 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 flow rate is based on specification from manufacturer, as the rate specified is based on the flow rate when it is set to Max/High Speed.

When relevant, the external static pressure shall be greater than or equal to the minimum external static pressure defined for the measurements at T1 or T3 (or specified temperature class defined in Table 9) and described in the corresponding standard per type of units

For information, the average cooling capacity and power of the unit during the test shall be reported.

5.8.5 Tolerances for high temperature operating test

The tolerance for the outdoor temperature is ±0.6 ºC (or ±1 ºF).

The tolerances for the power and thermal capacities are identical to the tolerances used for determination of the power and capacities at T1 or T3 testing conditions.

6. Criteria for acceptability of products at registration

6.1 General

Registration of products is necessary to enter into Bahrain market and mandatory for both imported and locally manufactured products.

To ensure the compliance to MEPS and operability test, the manufacturer shall submit evidence of the performances claimed according to PATH A or PATH B, demonstrated below.

When products covered by the scope of this regulation are assembled on a modular structure defined as Modular Unit and including multiple units, the performance of each unit can be used to confirm the performance of the Modular Unit.

For products with capacity over the capacity of certified products (PATH A only), over the capacity of the lab (PATH A or PATH B) or for specific design the applicant shall add a technical note, based on a similar certified or tested products (using same compressor(s) unit(s) used as reference). In this case the test report or certificate of the unit used as reference shall be attached for the registration.

6.2 PATH A – Product using the AHRI certification program

The product(s) submitted for registration shall present a valid AHRI certification covering the mode(s) registered. If a product fails AHRI certification or if its certification is removed, the product registration will be automatically canceled.

Operability at 52° C is verified by test or based on self-declaration (in this case justification of the operability at 52° C and a guaranty of operation of the product at the specified conditions shall be included in the declaration).

Note: If the cooling capacity of the product is out of the scope of AHRI certification program, then PATH B applies.

6.3 PATH B – Product using test report as evidence of the declared performances

6.3.1 General

A test report, per product, from an accredited laboratory (as per clause 3.2) shall be presented for registration.

This test report shall include results for cooling capacity and EER at T1 or T3.

Operability at 52° C is verified by test or based on self-declaration (in this case justification of the operability at 52° C and a guaranty of operation of the product at the specified conditions shall be included in the declaration).

The test procedure shall correspond to the type of product and relevant testing standard as described in Clause 5.

6.3.2. Conditions for the test report and technical justification

For products with specific design or with capacities are higher than the maximum capacity available from accredited laboratory a technical justification shall be presented. The conditions and content of this technical justification are expressed below.

- Test report shall correspond to the model tested
- Test for one sample is sufficient
- Technical justification for products not able to present a test report of the model registered. Content of the technical justification includes:
    a) Certificate or test report of a model used as reference;
    b) Justification for representability of the reference model;

c) Identification of the method used to predict EER (or NsensCOP);
d) Information about relevance and applicability of the method used;
e) Information that validates the operability at 52°C;
f) Any information that validates the prediction of the EER (or NsensCOP).

6.3.3. Criteria for acceptability

The values presented in the test report shall be accepted as valid if they meet the following criteria for cooling, as applicable:

a) Tested effective power input .....≤ 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) The standard for tests is according to the type of A/C in Clause 5;
f) Tested voltage is according to Table 3;
g) Tested frequency is according to Table 1.

7. Criteria for market surveillance

7.1 Periodic verification for Air-Conditioners using PATH A for registration

For products registered using PATH A, Bahrain implements its own procedure to check the validity of AHRI certification.

In case the product registered is no more AHRI certified, the registration will be canceled.

7.2 Criteria for acceptability

The product shall be tested based on the corresponding ANSI/AHRI or ISO standards as registered through national registration system.

The values shall be accepted as valid when a single sample of an appliance or unit model tested according to relevant standard corresponding to the type of AC and presented in Clause 5 meets the following criteria for cooling, as applicable:

a) Tested effective power input .....≤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) The standard for tests is defined according to the type of A/C in Clause 5;
f) Tested voltage is according to table 3
g) Tested Frequency is according to table 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
- Month and year 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 testing and rating standard:
  - Rated current in amperes (A)
  - Rated power input in Watt (W) or kilowatts (kW)
  - Rated cooling capacity in kW and Btu/h or kW and TONS (TR) for chillers only
  - Rated heating capacity in kW and Btu/h
  - Rated Energy Efficiency Ratio (EER) in Btu/(W.h) or Rated Net sensible coefficient of performance (NsensCOP) in W/W when relevant
  - Refrigerant used and mass of refrigerant charge in kg.

8.3 Additional nameplate voltage requirements for 60 Hz equipment

Nameplate voltages for 60 Hz systems shall include one or more of the equipment nameplate voltage ratings shown in Clause 4.

8.4 Instruction sheet

An instruction sheet *(*basic instructions with description for storage, installation, etc.*)* 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 8.1
- Dimensions of the unit (in mm) 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 considered to ensure its safe use and maintenance
- Instructions for packing and unpacking the unit
- Instructions on unit handling and rigging
- Weight of the unit, both the net and the gross
- Refrigerant type, refrigerant charge by mass, including method of charging and discharging refrigerant

9. Registration requirements

The registration procedure will be announced later.