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Pakistan
Minimum Energy Performance Standard (MEPS)
For Window Type & Split Air Conditioners
With Cooling Capacity under: 14000 W
(12000 – 48000 BTU/hr)



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FOREWORD

In order to reduce energy consumption and achieve energy conservation through the use of energy efficient appliances, there is a need to promote a new culture of energy efficient products, by taking appropriate measures through development of policies and promulgation of laws, rules/ regulations and standards.

To cope with the above mentioned requirement, a document describing the minimum values of energy efficiency and rating criteria for Single Phase, 220/240V split and window type Air Conditioners with a cooling capacity under 14000 Watt, has been developed for voluntary compliance. This document lays down Minimum Energy Performance Standards (MEPS) to be followed/ met by the local manufacturers and importers of air conditioners to get their product qualified through testing as “Energy Efficient Product”.

This activity will help reduce the level of energy consumption in the country and will facilitate transforming the present market culture into energy efficient culture, thereby contributing greatly towards energy conservation in the country and achieving the reality of tomorrow’s “GREEN PAKISTAN”.

**Managing Director ENERCON/
National Project Director, BRESL
Pakistan**



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1. Purpose:

To provide guidelines on setting up of minimum requirement limits for energy performance testing and rating of single phase, 220/240V split and window type Air Conditioners with cooling capacity under 14000 Watts, in Pakistan and to match with world best practices of energy performance testing of this type of Air Conditioners.

2. Scope:

The purpose of this document is to provide information on new energy standards for air conditioners that will facilitate trade of high efficient ACs across the globe. In year (2011-12) the production of Air Conditioners and Refrigerators increased by 5.39 percent as compared to the corresponding period of previous year. This trend is recently increasing due to rising living standards in several countries combined with a cost reduction of AC products. This tendency is contributing to an increase in greenhouse gas emissions across the world.

As many as 180,778 air conditioners were produced during July, April (2011-12) against the production of 171,535 units during July April (2010-11), according to the data of Pakistan Bureau of Statistics (PBS).

The growth in production of air conditioners and equally growing demand, including imports of air conditioners mostly from China, has augmented a need to introduce minimum energy performance levels for air conditioners in order to reduce the burden on energy resources and to limit the drainage of electricity through inefficient air conditioners. The aim is to achieve energy conservation with an added benefit of reduced greenhouse gas emissions.

3. Applicability:

The standard specifies the values of energy efficiency, the evaluating values of energy conservation, the rating of energy efficiency, testing method, checking and accepting rules of room air conditioners.



This standard is applicable to air conditioners using air cooling condenser, closed motor compressor, with cooling capacity under 14000W and working under climate conditions T1 & T3¹.

The standard does not apply to speed variable, mobile and multi-connected air conditioners / heat pump units including:

- a) Water-source heat pumps or water cooled air conditioners;
- b) Multi-split-system air conditioners and air-to-air heat pumps
- c) Mobile (windowless) units having a condenser exhaust duct;
- d) Individual assemblies not constituting a complete refrigeration system;
- e) Equipment using the absorption refrigeration cycle.

3. Normative References:

The following documentary standards, through reference in this text, constitute the provision of this standard. The latest edition of the normative documents is applicable for this standard.

- PS: ISO : 5151- 2010; Non-ducted air conditioners and heat pumps — Testing and rating for performance

Note: For determination of accurate seasonal efficiencies, appropriate climatic condition values as defined in this standard i.e. T1 or T3 must be used during testing.

4. Terms & Definitions:

The following terms and definitions apply to this standard in addition to those already defined internationally.

4.1 The Minimum Allowable Values for Energy Efficiency of Air Conditioners

The minimum allowable values are the values of energy efficiency for air conditioners when operating under Specified Working Conditions.

4.2 The Evaluating Values for Energy Conservation of Air Conditioners

The Evaluating Values of Energy Conservation of Air Conditioners are the minimum allowable values of energy efficiency of air conditioners to reach the requirements of energy conservation product certification when operating under rated working conditions.

4.3 Contents of this document ,including Energy Performance Values for grant of “Pakistan Energy Label” shall be reviewed within subsequent term of every 3 years (tentative time scale: it may be decided under acceptance from manufacturers /importers or as needed under the law).

¹ T1: Standard cooling capacity rating conditions for moderate climates.

T3: Standard cooling capacity rating conditions for hot climates.



4.4 The Energy Efficiency Endorsement of Air Conditioners

The energy efficiency endorsement for room air conditioners is a labeling procedure for air conditioners which are tested under the provisions of testing protocol PS: ISO: 5151 in an accredited laboratory and such units which meet the minimum performance criteria as defined in section 5 of this standard.

The air conditioners successfully qualifying under the test conditions of PS: ISO: 5151 and meeting the minimum energy performance criteria, as defined in section 5 of this standard, shall be eligible to apply for energy efficiency label / endorsement logo from ENERCON Pakistan.

The manufacturers/importers of energy efficient air conditioners shall be eligible to affix the energy efficiency label /endorsement logo on their products which qualify under the provisions of testing protocol “PS: ISO: 5151” and meet the minimum energy performance standards as defined in section 5 of this MEPS.

The authority responsible for issuing energy efficiency label /endorsement logo in Pakistan is National Energy Conservation Centre (ENERCON). The products which meet the requirements of this standard may obtain the label/ endorsement logo by applying to ENERCON. The ENERCON has an approved energy efficiency labeling procedure Doc No: “ES&L/P-01/2012”, which contains the detailed guidelines and necessary forms/documents to apply for Energy Efficiency Label / Endorsement Logo.

5. Technical Requirements

5.1 Minimum Values of Targeted Energy Efficiency -

The tested energy efficiency ratio of air conditioners should be greater or equal to the values specified in Table 1.

Type	Cooling Capacity (CC) W (BTU)	Energy Efficiency Ratio (EER) W/W
Window	3517 – 4499 (558.86 -714.91)	2.90
Split	≤ 4500 (715.07)	3.20
	4500 - ≤ 7100 (715.07-1128.22)	3.10
	7100 - ≤ 14000 (1128.22-2224.67)	3.00

Table 1: Targeted Minimum Values of Energy Efficiency



5.2 Determination of Energy Efficiency Ratio (EER)

The air conditioner EER is its British thermal units (BTU) rating over its wattage. It can be expressed as: $EER = q_c / p$ where q_c = cooling energy (Btu/hr) p = power consumption (Watts)

For example, if a 10,000-BTU/hr air conditioner consumes 1,900 watts/hr, its rating is 5.2 (10,000 BTU/1,900 watts) which is an ideal scenario as it ignores the in-efficiencies and power losses during the cooling process. To determine the actual EER, the BTU may be converted into Watts by using equation as: 1 BTU = 0.2930711 Watt and then dividing it by the input power. This will give the realistic EER for the air conditioner also entailing the losses/inefficiencies. An example for determination of EER through Watt/Watt method is given below;

$$EER = (10,000 \text{ BTU} \times 0.2930711) / 1900 = 1.542$$

Generally, the higher the rating is, the more efficient the air conditioning unit is.

5.3 Tolerance in Determination of Energy Efficiency Ratio (EER) for Energy Efficiency Labeling

At initial stage this standards allow some tolerances for air conditioning units which are tested under the provisions of ISO: 5151. The allowable values to qualify for applying for energy efficiency labeling are specified in Table-2 below.

Type	Cooling Capacity (CC) W	Targeted - Energy Efficiency Ratio (<i>EER</i>) W/W	Tolerance in Energy Efficiency Ratio (EER) W/W	
			Max	Minimum
Window	3517 - 4499	2.90	∞	2.75 (@ 5%)
Split	≤ 4500	3.20	∞	3.04 (@ 5%)
	4500 - ≤ 7100	3.10	∞	3.00 (@ 3%)
	7100 - ≤ 14000	3.00	∞	2.94 (@ 2%)

Table 2: Minimum Allowable Values of Energy Efficiency for EE Labeling



6. Test Methods, Test Reports and Selection of Sample

The test for evaluating Energy Efficiency Ratio (EER) shall be conducted according to the requirements as specified in ISO: 5151.

The test report shall include the test method used i.e. balanced ambient room type calorimeter test or air enthalpy method. The results of the part load test(s) and the calculation of EER must be presented; additionally the results of COP and reference SEER etc may also be included where applicable.

6.1 Test Report

In the test report, the calculated EER and COP values and reference SEER /SCOP² values shall be based on the test results.

The test values of Energy Efficiency Ratio (EER) shall be presented up-to a two decimal fraction.

6.2 Selection of Sample for Test

The values presented in the test reports shall be based on the exact sample air conditioner chosen for the test. The energy efficiency label may only be affixed to the exact class/type of air conditioners, of which the sample is selected and tested.

For testing of energy efficiency ratio, one sample may be selected for each class/type. If it fails to meet the minimum requirements of this standard and test results, then two samples of the same class/type may be selected for the test, in this case both samples shall meet the test requirements and resulting values shall be within the acceptable limits as defined in section 5 of this standard. The sample not meeting the requirements of this standard may deem disqualified for energy efficiency labeling.

7. Labeling

7.1 Affixing of Energy Efficiency Label

The energy efficiency rating label shall be in the form of a sticker and affixed on the top of AC enclosure, as well as on the packing, so that the label is prominent and clearly visible. The label shall display the approved energy star rating for the model/type of the air conditioner. The format of the energy efficiency rating label shall be as given in Figure-1.

² (COP) – Coefficient of Performance, (SCOP) - Seasonal Coefficient of Performance, (SEER) – Seasonal Energy Efficiency Ratio



7.2 Color of Energy Efficiency Rating Label

Sample energy star rating label is given in Figure-2 for information only and the colors of the energy star label shall follow Adobe RGB or s RGB color profile, as under:

Yellow:	R=255,	G=255,	B=0
Red:	R=255,	G=0,	B=0
Green:	R=0,	G=150,	B=60

where, R = Red, G = Green, and B = Blue



Figure-1: Format for the Energy Efficiency Rating Label

- Number of stars appearing on the curved band depends on the energy rating determined as per section 4 of this standard. More stars mean more energy efficient.
- Number of stars (in words) permitted for the model/type.
- Brand name, model number and cooling capacity of the air conditioner printed in the space provided.

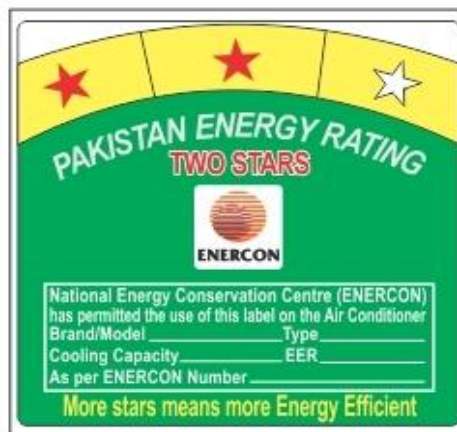


Figure-2: Sample of Printed Energy Efficiency Rating Label



7.3 Dimensions of the Energy Efficiency Rating Label

Dimensions of the energy star label shall be as given in Figure-3.

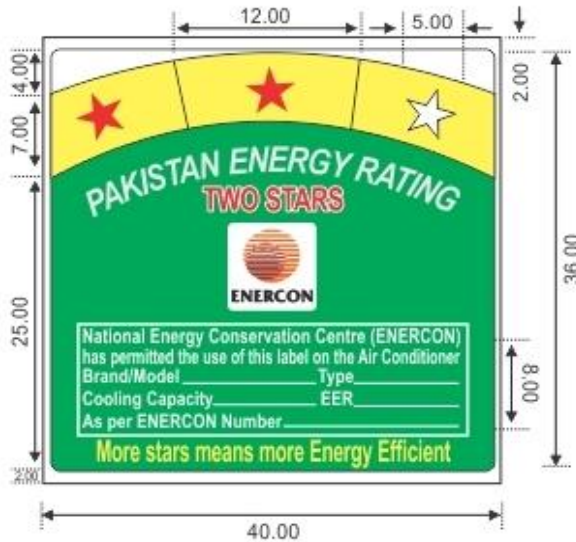


Figure-3: Dimensions of the Energy Efficiency Rating Label (all values in mm)

7.4 Character Size (height) of the Energy Efficiency Rating Label

Character size (height) of the energy star label shall be as given in Figure-4.

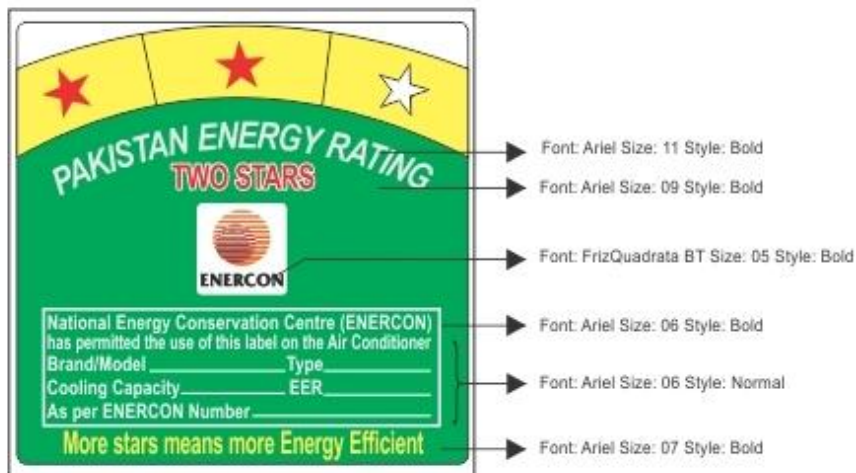


Figure-4: Print Type and Character Size of the Energy Efficiency Label



7.5 Color of Energy Efficiency Endorsement Logo

Sample energy efficiency endorsement logo shown in the energy efficiency star rating label is given in Figure-5 for information only and the colors of the logo shall follow Adobe RGB or sRGB color profile, as follows:

- 1) Outer loop of logo: R=131, G=26, B=23
- 2) Middle loop of logo: R=161, G=41, B=39
- 3) Inner loop of logo: R=129, G=40, B=42

Where, R = Red, G = Green, and B = Blue



Figure-5: Sample of Printed Energy Efficiency Endorsement Logo

7.6 Dimensions of the Energy Efficiency Endorsement Logo

Dimensions of the energy efficiency endorsement logo shall be as given in Figure-6.

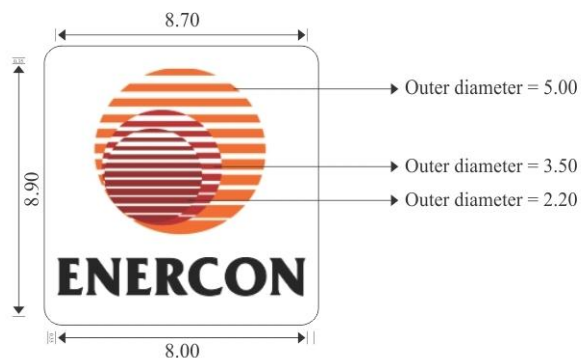


Figure-6: Dimensions of Energy Efficiency Endorsement Logo (all values in mm)

Details of the dimensions given in Figure-6 are further elaborated as under:

1) Outer/large circle:

Outer Diameter = 22.0mm
Thickness = 4 pt
Number of horizontal bars = 11



2) Inner small circle:

Outer Diameter = 15.8mm
Thickness = 4 pt
Number of horizontal bars = 11

3) Inner most circle:

Outer diameter = 12.8mm
Thickness = 4 pt
Number of horizontal bars = 11

7.7 Character Size (height) of the Energy Efficiency Endorsement Logo

Character size (height) of the energy efficiency endorsement logo shall be as given in Figure7.

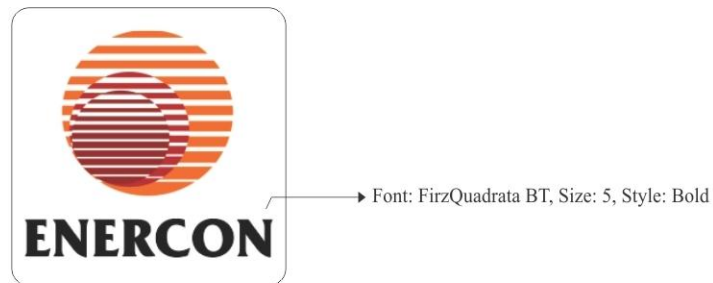


Figure-7: Print Type and Character Size of the Energy Efficiency Endorsement Logo

7.8 Prohibited information

Advertising information, other than that being included on the energy efficiency label, is prohibited.

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