

## Requirements on Minimum Energy Performance Standard, Labelling and Inspection of Fans (Draft)

1. The fans referred to in this Announcement are those driven by a three-phase AC motor (“Fans” or “products” hereafter), including axial fan, centrifugal forward curved fan, centrifugal radial bladed fan, centrifugal backward curved fan(with housing), centrifugal backward curved fan(without housing) and mixed flow fan, which shall be in compliance with the applicable scope set out in the Appendix 1.
2. Fans shall be tested for the energy efficiency measured value pursuant to the currently effective National Standards of the Republic of China (“CNS”) 7778 or other approved equivalent means International Organization for Standardization (“ISO”) 5801, or Air Movement and Control Association (“AMCA”) 210.

The measured energy efficiency values of the Fans in the preceding paragraph shall not be lower than the minimum energy performance standard requirements for Fans (see Appendix 2) and shall be higher than or equal to the rated value of product. The three-phase AC motors driving the fans which are designated by the Central Competent Authority's announcement shall comply with the minimum energy performance standards for the motors.

3. While manufacturing or importing the Fans for domestic use, the product manufacturer or importer (hereafter referred to as “Dealer”) shall submit the following documentation to the Central Competent Authority to apply for the registration account and password for Minimum Energy Performance Standard Management System (hereafter referred to as “Management System”), in order to access the Management System:
  - (1) Original copy of the Application Form for Management System Registration Account and Password (Appendix 3).
  - (2) Copy of the Dealer’s corporate registration certificate or commercial registration certificate, or other equivalent certificates.
4. After obtaining the Management System account and password, the Dealer shall apply for registration of the energy efficiency via the Management System, and submit the following documentation to the Central Competent Authority:
  - (1) Original Copy of the Application Form for Registration of Fans Energy Efficiency (see Appendix 4).
  - (2) Registration of main models: For application for more than nine main models of each category of Fans, the Dealer shall provide copies of the test reports on energy efficiency of eight main models designated by the Central Competent Authority with official corporate seal of the Dealer. While applying for the registration of no more than eight main models, copies of the test reports on energy efficiency of all the main models in application shall be submitted with official corporate seal of the Dealer.

For the registration of main models, Fans with either different impeller diameter, the transmission connection method and inlet conditions (single suction/double suction) shall be deemed Fans of different main models.

The energy efficiency test report mentioned in Section 4. (2) shall be issued by laboratories approved by the certified authorities that are members to the mutual recognition agreement signed by the Taiwan Accreditation Foundation (“TAF”) and the International Laboratory Accreditation Cooperation (“ILAC”), or be issued by Underwriters Laboratories Inc. (“UL”) or Technischer Überwachungs-Verein (“TÜV”).

5. The Central Competent Authority shall approve the registration number of the product in accordance with the energy efficiency test report and energy efficiency rated value registered by the Dealers. The Central Competent Authority may conduct product sampling and testing before approving, and the Dealer shall bear the related costs.
6. When manufacturing or importing the Fans for domestic use, the Dealer shall re-apply for the registration for the energy efficiency in the following instances:
  - (1) The design of the product has been changed and such change affects its energy efficiency.
  - (2) The product model number has been changed.
7. While manufacturing or importing the products for domestic use, the Dealer shall post the following items on strong nameplates on a prominent area of the products the Dealer. These items shall all be labeled in Traditional Chinese, provided that the unit symbols, special characters, trademark and symbol cannot be indicated in Traditional Chinese. The Dealer shall not conceal, destroy or in any other way make the following information unrecognizable:
  - (1) Name of the product: axial fan, centrifugal forward curved fan, centrifugal radial bladed fan, centrifugal backward curved fan(with housing), centrifugal backward curved fan(without housing) and mixed flow fan;
  - (2) Product’s model number: different main models shall have different main model number; the model number shall be main model number- secondary number;
  - (3) Rated power (kW), rated voltage (V), pole and frequency of motor: it refers to the information of motor; if this information has been labeled on the nameplate of motor in fan, it can be omitted;
  - (4) Measurement category (A/B/C/D): used to determine the energy efficiency, pursuant to the active CNS 7778;
  - (5) Impeller diameter (millimeter, mm);
  - (6) Volume flow rate (m<sup>3</sup>/min): at the best efficiency point;
  - (7) Static pressure or total pressure (mmAq): at the best efficiency point;
  - (8) Rotations per minute (rpm): at the best efficiency point;

- (9) Input power (kW): at the best efficiency point;
- (10) Efficiency (%): at the best efficiency point;
- (11) Efficiency grade: The actual measured efficiency grade and the efficiency grade corresponding to the minimum energy performance standard (N value) shall be marked, such as FMEG 68/64.
- (12) Product's registration number;
- (13) Number and year of manufacture;
- (14) Production country or region;
- (15) Name of the manufacturer or OEM consigner: for imported products, the name of the manufacturer or OEM consigner, agent, or distributor shall be labeled.

Fans with or without three-phase AC motors shall be labeled in conformity with the requirements as set forth in the preceding paragraph while being exhibited or sold.

- 8. While manufacturing or importing the products for domestic use, the Dealer shall report the sales volume of the previous year in the management system before the end of February each year.
- 9. The Central Competent Authority may designate the model and volume of Fans annually for product sampling and testing. The Dealer shall send such product to the designated testing laboratory for testing within the period informed by the Central Competent Authority, or the Central Competent Authority may designate personnel or professional institutions to witness the testing procedures and methods. The measured energy efficiency value of the product should be above 95% of the rated value of the product, and comply with the minimum energy performance standard requirements.

For products fail to meet the requirements in the preceding paragraph, the Central Competent Authority shall request the related Dealer to re-submit samples for re-testing. The re-tested samples shall be of the same model and twice as many as the first-tested samples. All the incurred cost associated with the re-testing shall be borne by the Dealer.

- 10. The volume of the first sampling and testing products in Section 9 shall be determined based on the total amounts of the products sold by each Dealer in the preceding year:
  - (1) One sample shall be tested out of 100 units of axial fans, a maximum of 5 units for each Dealer, while there are less than 100 units sold, one sample shall still be tested.
  - (2) One sample shall be tested out of 300 units of centrifugal forward curved fans, a maximum of 5 units for each Dealer, while there are less than 300 units sold; one sample shall still be tested.
  - (3) One sample shall be tested out of 50 units of centrifugal radial bladed fans, a maximum of 5 units for each Dealer, while there are less than 50 units sold, one sample shall still be tested.
  - (4) One sample shall be tested out of 200 units of centrifugal backward curved fans (with housing), a maximum of 5 units for each Dealer, while there are less than 200 units sold, one sample shall

still be tested.

(5) One sample shall be tested out of 50 units of centrifugal backward curved fans (without housing), a maximum of 5 units for each Dealer, while there are less than 50 units sold, one sample shall still be tested.

(6) One sample shall be tested out of 50 units of mixed flow fans, a maximum of 5 units for each Dealer, while there are less than 50 units sold, one sample shall still be tested.

The Central Competent Authority may adjust the sampling volume prescribed in the preceding paragraph based on actual needs.

11. Where a Dealer fails to conduct the product testing or re-testing in compliance with the preceding paragraph, or where the re-tested samples fail to completely comply with the requirements, the Central Competent Authority shall act in accordance with Articles 21 and 24 of the Energy Management Act. For those fail to complete the corrective actions within the designated period, the Central Competent Authority shall annul its energy efficiency registration, except where the Dealer fails to conduct the energy efficiency test due to the fact that the designated sampling and testing products are no longer produced or imported, and the Central Competent Authority has agreed and canceled its energy efficiency registration.

The Central Competent Authority shall disclose the information under the preceding paragraph on the Management System pursuant to the Consumer Protection Act and the relevant regulations.

## Appendix 1

### Applicable Scope of Fans

#### 1. Applicable Scope:

This standard applies to fans, which have impeller diameter range from 0.125m to 2m, rated power of 0.75 (1HP) to 200kW (270HP), static pressure is 15 to 1000 mmAq, volume flow rate is 10 to 3000 m<sup>3</sup>/min., and driven by a three-phase AC motor, including:

##### (1) Axial fan:

A fan that propels gas in the direction axial to the rotational axis of impeller(s). It may or may not be equipped with a cylindrical housing, an orifice panel or orifice ring, or an inlet or outlet guide vanes.

##### (2) Centrifugal forward curved fan:

A fan in which the gas enters the impeller(s) in an essentially axial direction and leaves it in a direction perpendicular to that axis. The outward direction of the blades of the impeller(s) at the periphery is forward relative to the direction of rotation, and the impeller may have one or two inlets.

##### (3) Centrifugal radial bladed fan:

A fan in which the gas enters the impeller(s) in an essentially axial direction and leaves it in a direction perpendicular to that axis. The outward direction of the blades of the impeller(s) at the periphery is radial relative to the axis of rotation, and the impeller may have one or two inlets.

##### (4) Centrifugal backward curved fan (with housing):

A fan in which the gas enters the impeller(s) in an essentially axial direction and leaves it in a direction perpendicular to that axis. The outward direction of the blades of the impeller(s) at the periphery is backward relative to the direction of rotation, the impeller may have one or two inlets, and which has a housing.

##### (5) Centrifugal backward curved fan (without housing):

A fan in which the gas enters the impeller(s) in an essentially axial direction and leaves it in a direction perpendicular to that axis. The outward direction of the blades of the impeller(s) at the periphery is backward relative to the direction of rotation and which does not have housing.

##### (6) Mixed flow fan:

A fan in which the gas path through the impeller is intermediate between the gas path in fans of centrifugal and axial types.

Note: "housing" means a casing around the impeller which guides the gas stream towards, through and from the impeller;

#### 2. Excluded Items:

- (1) Fire-fighting smoke extraction fan: refers to fans equipped with a high-temperature smoke exhaust motor, the relevant certification documents are submitted and approved by the Central

Competent Authority. It can refer to the regulations of Outline Specifications in for Public Construction in "Chapter 15835 Fans for Smoke Exhaust Equipment of Fire Fighting System" or the relevant provisions in CNS21927-3.

- (2) Cooling tower fan: a fan installed on the cooling tower for sale, and cannot be tested separately.
  - (3) Jet fan: a fan designed and marketed specifically to produce a high-velocity air jet in a space to increase its air momentum. Jet fans are rated using thrust. Inlets and outlets are not ducted but may include acoustic silencers.
  - (4) Induced-flow fan: a type of laboratory exhaust fan with a nozzle and windband; the fan's outlet airflow is greater than the inlet airflow due to induced airflow.
3. While manufacturing or importing the products for domestic use, if the Dealer declares that it is not within the scope of application, or declares that the product is not for domestic users, the Central Competent Authority may require the Dealer to provide relevant documents such as design data or shipment details when necessary.

## Appendix 2

### Minimum Energy Performance Standard Requirements for Fans

Fan types	Measurement category(A-D)	Efficiency category (static or total)	Power range $P_e$ in kW	Minimum Energy Performance Standard Requirements	Fan motor efficiency grade, FMEG (N)
Axial fan	A,C	static	$0.75\text{kW} \leq P_e \leq 10\text{kW}$	$\eta=2.74 \times \ln(P_e)-6.33 +N$	40
			$10 \text{ kW} < P_e \leq 200\text{kW}$	$\eta=0.78 \times \ln(P_e)-1.88 +N$	
	B,D	total	$0.75\text{kW} \leq P_e \leq 10\text{kW}$	$\eta=2.74 \times \ln(P_e)-6.33 +N$	58
			$10 \text{ kW} < P_e \leq 200\text{kW}$	$\eta=0.78 \times \ln(P_e)-1.88 +N$	
Centrifugal forward curved fan and centrifugal radial blade fan	A,C	static	$0.75\text{kW} \leq P_e \leq 10\text{kW}$	$\eta=2.74 \times \ln(P_e)-6.33 +N$	44
			$10 \text{ kW} < P_e \leq 200\text{kW}$	$\eta=0.78 \times \ln(P_e)-1.88 +N$	
	B,D	total	$0.75\text{kW} \leq P_e \leq 10\text{kW}$	$\eta=2.74 \times \ln(P_e)-6.33 +N$	49
			$10 \text{ kW} < P_e \leq 200\text{kW}$	$\eta=0.78 \times \ln(P_e)-1.88 +N$	
Centrifugal backward curved fan with housing	A,C	static	$0.75\text{kW} \leq P_e \leq 10\text{kW}$	$\eta=4.56 \times \ln(P_e)-10.5 +N$	61
			$10 \text{ kW} < P_e \leq 200\text{kW}$	$\eta=1.1 \times \ln(P_e)-2.6 +N$	
	B,D	total	$0.75\text{kW} \leq P_e \leq 10\text{kW}$	$\eta=4.56 \times \ln(P_e)-10.5 +N$	64
			$10 \text{ kW} < P_e \leq 200\text{kW}$	$\eta=1.1 \times \ln(P_e)-2.6 +N$	
Centrifugal backward curved fan without housing	A,C	static	$0.75\text{kW} \leq P_e \leq 10\text{kW}$	$\eta=4.56 \times \ln(P_e)-10.5 +N$	62
			$10 \text{ kW} < P_e \leq 200\text{kW}$	$\eta=1.1 \times \ln(P_e)-2.6 +N$	
Mixed flow fan	A,C	static	$0.75\text{kW} \leq P_e \leq 10\text{kW}$	$\eta=4.56 \times \ln(P_e)-10.5 +N$	50
			$10 \text{ kW} < P_e \leq 200\text{kW}$	$\eta=1.1 \times \ln(P_e)-2.6 +N$	
	B,D	total	$0.75\text{kW} \leq P_e \leq 10\text{kW}$	$\eta=4.56 \times \ln(P_e)-10.5 +N$	62
			$10 \text{ kW} < P_e \leq 200\text{kW}$	$\eta=1.1 \times \ln(P_e)-2.6 +N$	

Note:

- $P_e$  is the power measured at the mains input terminals to the motor of the fan when the fan is operating at its best efficiency point (kW), N is fan motor efficiency grade, and  $\eta$  is minimum energy performance standard requirements (%) in the table.
- Best efficiency point : means the maximum efficiency achieved at a point on its operating characteristic.
- The Measurement category of fans during the test is in accordance with the provisions of CNS 7778, ISO 5801 or AMCA 210, among which  
A: refers to free inlet and free outlet;  
B: refers to free inlet and ducted outlet;  
C: refers to ducted inlet and free outlet;  
D: refers to ducted inlet and ducted outlet;
- The measured energy efficiency values of the fan shall not be lower than the minimum energy performance standard requirements  $\eta$  as calculated by preceding table and shall be higher than or equal to the to the rated values of product.

5. The measured energy efficiency value of fans shall be calculated to the first place of decimal fraction and rounded up after decimal fraction.
6. The measured energy efficiency value of fans shall be calculated according to the following formulas:

Measurement category A or C

$$\eta_{es} = \frac{P_{us}}{P_e} = \frac{q \times P_{fs} \times k_{ps}}{P_e}$$

Measurement category B or D

$$\eta_e = \frac{P_u}{P_e} = \frac{q \times P_f \times k_p}{P_e}$$

Where

$\eta_{es}$  ,  $\eta_e$  : the overall efficiency of fan static pressure and fan total pressure respectively, at its best energy efficiency point (%);

$P_{us}$ ,  $P_u$ : the fan static pressure gas power and total pressure gas power respectively, at its best energy efficiency point(kW).

$Q$  : inlet stagnation volume flow rate, at the best efficiency point(m<sup>3</sup>/sec);

$P_{fs}$  : the fan static pressure (KPa ; KPa =101.97mmAq); means the fan total pressure ( $P_f$ ) minus the fan dynamic pressure corrected by the Mach factor, at the best efficiency point;

$P_f$  : the fan total pressure (KPa ; KPa =101.97mmAq); means the difference between the stagnation pressure at the fan outlet and the stagnation pressure at the fan inlet, at the best efficiency point;

$k_{ps}$ ,  $k_p$  : the compressibility coefficient of fan static pressure and fan total pressure respectively, calculated according to the equations under CNS 7778, ISO 5801 or AMCA 210.

$P_e$  : the power measured at the mains input terminals to the motor of the fan when the fan is operating at its best efficiency point(kW).

7. When the impeller diameter of the ventilator differs within 5%, it is regarded as the same main model. When the impeller diameter differs by more than 5%, it shall be registered as a different main model.
8. When applying for registration, the efficiency and related information of all product combinations under the main model shall be registered, and the measured energy efficiency values at the best efficiency point of all product combinations shall not be lower than the minimum energy performance standard requirements, and shall be higher than or equal to the rated value of product.

## Appendix 3

### Application Form for Minimum Energy Performance Standard Management System Account and Password

Prepared on (ROC year, month, date)

Applicant (Company): \_\_\_\_\_

Applicant: \_\_\_\_\_ Tel: \_\_\_\_\_ Fax: \_\_\_\_\_

E-MAIL: \_\_\_\_\_

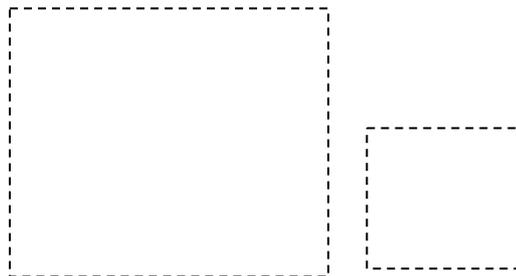
Category of the Product: \_\_\_\_\_

Account ID: \_\_\_\_\_

Password: \_\_\_\_\_

This company is applying for log-in and use of Minimum Energy Performance Standard Management System, and will be responsible for all information registered.

**Stamp (seals of the company and the responsible person):**



(official seals of the company and responsible person)

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## Appendix 4

Application number: \_\_\_\_\_

### Application form for registration of Energy Efficiency Performance Standard for Fans

Prepared on (ROC year, month, date)

#### 1. Applicant (Dealer) Information

Company name: \_\_\_\_\_

Company address: \_\_\_\_\_

Responsible Person: \_\_\_\_\_ Business ID: \_\_\_\_\_

Contact: \_\_\_\_\_ Department: \_\_\_\_\_ Title: \_\_\_\_\_

Tel: \_\_\_\_\_ Mobile: \_\_\_\_\_ Fax: \_\_\_\_\_

Email: \_\_\_\_\_

#### 2. Manufacturer Name and Address

same as the Applicant

Manufacturer name: \_\_\_\_\_

Manufacturer address: \_\_\_\_\_

#### 3. Contents of Registration

No.	Product name	Model No.	motor rated power (kW)	motor type/ Number of poles(P)	Rated voltage (V)/ Rated frequency(Hz)	Measurement category(A/B/C/D)	inlet conditions	Impeller diameter (mm)	Transmission connection methods	Volume flow rate at the best efficiency point (m <sup>3</sup> /min)	Static or total pressure at the best efficiency point (mmAq)	Rotation per minute at the best efficiency point (rpm)	motor input power at the best efficiency point(kW)	Efficiency at the best efficiency point (%)	Fan motor efficiency grade (FMEG)	fan dimensions	Production country or region
1.																	
2.																	

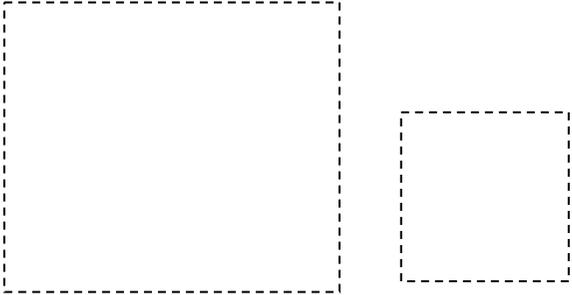
Note:

1. Dealer shall log in the Minimum Energy Performance Standard Management System to fill out the application form and download for further use.
2. Measure category: expressing by A, B, C, or D
3. Inlet conditions: means single inlet or double inlet
4. Fan motor efficiency grade : expression by Actual measured FMEG /MEPS ,ex FMEG68/64

#### 4. Application Declaration and Affidavit

This company hereby declares to the Central Competent Authority that all information contained in this application is true, and this company will be responsible for false, if any, and bear all legal liabilities. This company hereby declares that products available on the markets shall have the same energy efficiency labelling information as given in this application form. In case of any false, this company shall, without any objection, be subject to registration revocation and any disposition under the energy management regulations.

#### Stamp (Seals of company and responsible person)



(official seals of company and responsible person)

**5. Power of Attorney (not applicable for applicants apply for registration by themselves)**

For those apply for registration through attorney(s), the attorney(s) shall be approved by the applicants.

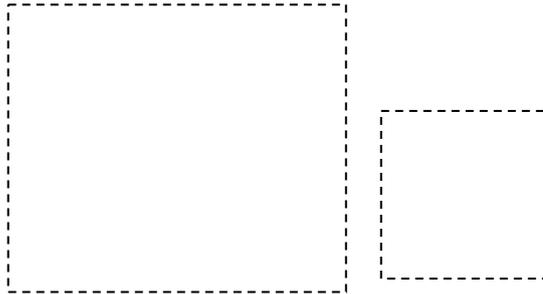
Company Name of the Attorney:

Responsible Person:

Address:

Business ID:

Tel:



(official seals of company and responsible person)

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