

IMPLEMENTING GUIDELINES OF THE PHILIPPINE ENERGY LABELING PROGRAM FOR REFRIGERATING APPLIANCES

Pursuant to Section 9 of Department Circular No. 2020-06-0015, entitled “Prescribing the Guidelines of the Philippine Energy Labeling Program (PELP) for Compliance of Importers, Manufacturers, Distributors and Dealers of Electrical Appliances and Other Energy-Consuming Products (ECP)”, the Implementing Guidelines for Refrigerating Appliances, including the Particular Product Requirements (PPR) and Code of Practice (COPE) are hereby issued for the information and guidance of all those concerned and for compliance by all manufacturers, importers, distributors, dealers, retailers and other key stakeholders.

1. Particular Product Requirement (PPR) for Refrigerating Appliances.

The PPR for Refrigerating Appliances provides the requirements for Refrigerating Appliances and other relevant information:

1.1 Scope

This PPR covers refrigerating appliances with net volume capacity of 113 liters up to 600 liters for domestic and similar use.

The following are the categories:

1. Refrigerator
 - a. Manual Defrost
 - b. Frost Free
2. Refrigerator-Freezer
 - a. Manual Defrost
 - b. Frost Free

Note: This covers only vapor compression systems, both for inverter and non-inverter technology. Built-in types are covered in the scope. Freezers and wine cellars are not covered in the scope.

1.2 Definition of Terms

For the purpose of this PPR, the following definitions and those in PNS IEC 62552 and its future amendments shall apply:

Applicants – refers to Manufacturers / Importers / Distributors / Dealers.

Energy Efficiency Factor (EEF) - the total adjusted volume (in liters) divided by the energy consumption (in kilowatt-hour per 24 hours). Also stated under the COPE as the measurement of efficiency.

Energy Efficiency Performance Rating (EEDR) - product’s star rating, which is based on the ranges of EEF and is stated on the energy label.

Energy Efficiency Rating – as indicated in the energy label pertains to the rated Energy Efficiency Factor (EEF) of the refrigerating appliance.

Frost-free Refrigerating Appliance - refrigerating appliance in which all compartments are automatically defrosted with automatic disposal of the defrosted water and at least one compartment is cooled by a frost-free system.

Generic Models - refer to a range of models similar to the base model where all have the same major physical characteristics, construction, system design and other performance characteristics.

Refrigerating Appliance - insulated cabinet with one or more compartments that are controlled at specific temperatures and are of suitable sizes, cooled by natural convection or a forced convection system whereby the cooling is obtained by one or more energy-consuming means.

Refrigerator - Refrigerating appliance intended for the storage of foodstuff with at least one fresh food compartment.

Refrigerator-Freezer - refrigerating appliance having at least one fresh food compartment and at least one freezer compartment, where freezer temperature should not be higher than -18°C.

Type – as indicated in the energy label pertains to the type (mode of defrost) of defrosting of the refrigerators: manual defrost (one-door and two-door) or frost-free.

1.3 Normative References

The refrigerators covered under this PPR shall be tested, as applicable, according to but not limited to the following standards and their future amendments.

PNS IEC 62552-1 Household refrigerating appliances – Characteristics and test methods – Part 1: General requirements

PNS IEC 62552-2 Household refrigerating appliances – Characteristics and test methods – Part 2: Performance requirements

PNS IEC 62552-3 Household refrigerating appliances – Characteristics and test methods – Part 3: Energy Consumption and Volume

Considering the regular updating of standards, the latest edition of the PNS shall be used as reference. It is understood that future amendments of the PNS indicated in this PPR shall be applied after its promulgation. A transition period of one (1) year shall be provided to give ample time to all stakeholders to adjust and conform to the new requirements, if any.

1.4 Sampling Method for Verification Testing

A unit of base model or its generic model shall be randomly taken from the sampling location.

1.5 Specific Guidelines for the Conduct of Verification Testing

- 1.5.1 Test methods to verify conformity to the claimed information in the label shall be as specified in 1.3.
- 1.5.2 Samples shall be tested at a standard test voltage of 230V $\sim\pm 1\%$, 60Hz $\pm 1\%$.
- 1.5.3 All necessary operational settings required for the proper conduct of test shall be provided by the Applicant.
- 1.5.4 The declared volume of the manufacturer shall be measured prior to the conduct of energy consumption tests to determine the amount of water to be used in load processing.
- 1.5.5 The load processing should be commenced more than five (5) hours after the defrost heater operates.

The door of the unfrozen compartment shall be opened less than five (5) minutes after compressor “on”.

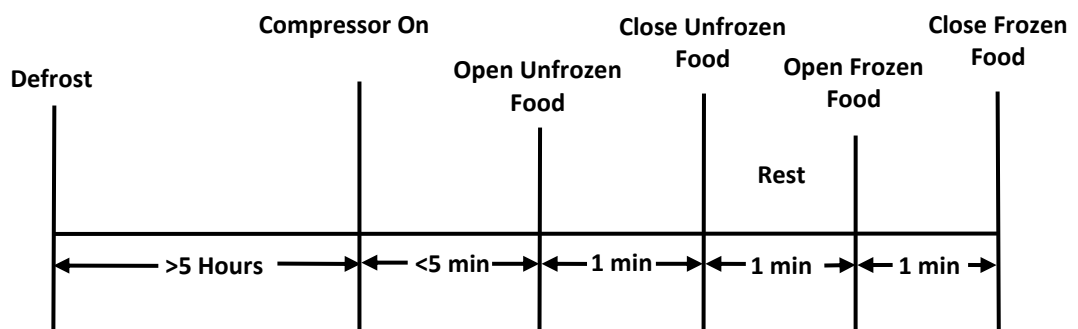
The series of steps including: the opening of the compartment door, the placing of the PET bottles inside the compartment, and the closing of the compartment door must be done within one (1) minute.

Rest for one (1) minute. Then, load the ice tray in freezer compartment within one (1) minute.

For load processing on frozen compartment, the series of steps including: the opening of the compartment door, the placing of the ice tray inside the compartment, and the closing of the compartment door must be done within one (1) minute.

For load processing calculations, please refer to PNS IEC 62552-3.

The process is illustrated below:



Sequence for Loading Process

1.5.6 The claimed rating for Freezing Capacity and Ice-Making shall be verified.

Conformance to Requirements for Various Case Conditions

Table 1a
Volume Determination

Case Condition	1 st Sample	2 nd Sample	3 rd Sample	Conformance
Case 1	Passed	Not Applicable	Not Applicable	Passed
Case 2	Failed	Not Applicable	Not Applicable	Failed

*Note: *Fail – Applicant may verify the test result*

Table 1b
Storage Temperature Test

Case Condition	1 st Sample	2 nd Sample	3 rd Sample	Conformance
Case 1	Passed	Not Applicable	Not Applicable	Passed
Case 2	Failed	Passed	Passed	Passed
Case 3	Failed	Passed	Failed	Failed
Case 4	Failed	Failed	Not Applicable	Failed

Table 1c
Energy Consumption Test

Case Condition	1 st Sample	2 nd Sample	3 rd Sample	Conformance
Case 1	Passed	Not Applicable	Not Applicable	Passed
Case 2	Failed	Passed	Passed	Passed
Case 3	Failed	Passed	Failed	Failed
Case 4	Failed	Failed	Not Applicable	Failed

Table 1d
Ice-Making Test (if applicable)

Case Condition	1 st Sample	2 nd Sample	3 rd Sample	Conformance
Case 1	Passed	Not Applicable	Not Applicable	Passed
Case 2	Failed	Passed	Passed	Passed
Case 3	Failed	Passed	Failed	Failed
Case 4	Failed	Failed	Not Applicable	Failed

Note: All test samples shall comply with the minimum requirements of 300g / 24hrs ice-making capacity in line with the ASEAN harmonization (for verification).

**Table 1e
Freezing Capacity Test (if applicable)**

Case Condition	1 st Sample	2 nd Sample	3 rd Sample	Conformance
Case 1	Passed	Not Applicable	Not Applicable	Passed
Case 2	Failed	Passed	Passed	Passed
Case 3	Failed	Passed	Failed	Failed
Case 4	Failed	Failed	Not Applicable	Failed

Note: All test samples shall comply with the minimum requirements of 3.5 kg of packages per 100 liters of freezer compartment.

**Table 2
Conformance Evaluation Matrix**

Case Condition	Volume Consideration	Storage Temperature	Energy Consumption Consideration	Ice-Making Test Consideration (if applicable)	Freezing Capacity Test Consideration (if Applicable)	Final Verdict	Remarks FCA
Case 1	P	P	P	P	P	P	
Case 2	P	P	P	P	F	F	√
Case 3	P	P	P	F	P	F	√
Case 4	P	P	F	P	P	F	√
Case 5	P	F	NA	NA	NA	F	
Case 6	F	P	P	P	P	F	√

Legend: F – Fail, P - Pass, FCA - For Corrective Action on claims according to Guidelines

Note 1: The table above will depend on the Applicant's declaration.

Note 2: Applies both for tolerances and MEPP.

Note 3: Replacement of defective units (that cannot be properly tested) shall be allowed up to three (3) times only. If the unit is still defective after the 3rd replacement, the testing shall be considered as failed.

1.6 Inspection of Generic Models

1.6.1 There is a difference in shelves, thermostat control, chiller, name plate rating, evaporator plate, heater and compressor that will affect air circulations.

1.6.2 In case of doubt, DOE-EPRED shall require the inspected units to be subjected to performance testing.

1.7 Minimum Energy Performance

All test samples shall have a rated EEF of not less than the Minimum Energy Performance for the different types of refrigerating appliances as follows:

- a. 200 l/kWh-24h, for One-Door Types
- b. 230 l/kWh-24h, for Two-Door Manual Defrost Types
- c. 180 l/kWh-24h, for Frost-Free Types

Note:

1. *The measured EEF shall be rounded off to a whole number.*
2. *The rules of rounding-off shall be followed.*

1.8 Tolerances

The following tolerances shall apply to all covered refrigerating appliances.

1.8.1 Volume

- 1.8.1.1 The measured volume shall not be less than 97% of the rated value or one (1) liter, whichever is higher.
- 1.8.1.2 The volume shall be rounded off to the 1st decimal in accordance with the rules on rounding off.
- 1.8.1.3 The measured percentage shall be rounded off to a whole number and the decision shall be based on the rounded off value.

1.8.2 Energy Consumption

- 1.8.2.1 The measured energy consumption shall not be more than 115% of the rated value.
- 1.8.2.2 The energy consumption shall be rounded off to the 2nd decimal in accordance with the rules on rounding off.
- 1.8.2.3 The measured percentage shall be rounded off to a whole number. The decision shall be based on the rounded off value.
Note: The measured daily energy consumption (kWh/24hr) on energy consumption test will be multiplied by 30 days to get the kwh/month.

1.8.3 Ice-Making Test

- 1.8.3.1 The measured ice-making capacity shall not be less than 85% of the rated value.
- 1.8.3.2 The value of Ice Making Capacity will be rounded off to the 3rd decimal.
- 1.8.3.3 The measured percentage shall be rounded off to a whole number. The decision shall be based on the rounded off value.

1.8.4 Freezing Capacity Test

- 1.8.4.1 The measured freezing capacity shall not be less than 85% of the rated value.
- 1.8.4.2 The freezing capacity shall be rounded off to the 1st decimal in accordance with the rules on rounding off.
- 1.8.4.3 The measured percentage shall be rounded off to a whole number. The decision shall be based on the rounded off value.

1.9 Storage Temperature

1.9.1 Refrigerating appliances shall have the following measured storage temperatures as follows:

One Door Refrigerator:

FZ = $\leq -6^{\circ}\text{C}$ and below

tma = 0°C to 4°C

Two Door Refrigerator:

FZ = $\leq -12^{\circ}\text{C}$ and below

tma = 0°C to 4°C

Refrigerator – Freezer:

FZ = $\leq -18^{\circ}\text{C}$ and below

tma = 0°C to 4°C


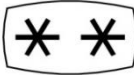
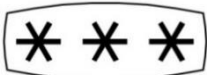
Note: tma = average temperature of fresh food compartment
FZ = Frozen food compartment

1.9.2 The refrigerator appliance shall be capable of simultaneously maintaining all required storage temperatures of the different compartments as stated in Table 2 of PNS IEC 62552 – Part 2.

1.10 Energy Consumption Test

1.10.1 Refrigerating appliances shall be tested according to the claimed star rating classification. The target temperature for the frozen food compartment shall be as follows:

Table 3. Coldness Star Rating of Frozen Food Compartment

Coldness Star	Symbols	Required Temperature
One Star		The frozen food compartment shall have temperatures of $\leq -6^{\circ}\text{C}$
Two Star		The frozen food compartment shall have temperatures of $\leq -12^{\circ}\text{C}$
Three Star		The frozen food compartment shall have temperatures $\leq -18^{\circ}\text{C}$

1.10.2 Refrigerating appliances must have the measured energy consumption taken at the following temperature range:

One Door Refrigerator:

FZ = $\leq -6^{\circ}\text{C}$ and below

tma = 0°C to 4°C

Multi-compartment Refrigerator:

FZ = $\leq -12^{\circ}\text{C}$ and below

tma = 0°C to 4°C

Refrigerator – Freezer

FZ = $\leq -18^{\circ}\text{C}$ and below

tma = 0°C to 4°C

Note: tma = average temperature of fresh food compartment
FZ = Frozen food compartment

- 1.10.3** In general, the measured energy consumption shall correspond to the exact temperature values stated above which can be obtained by interpolation.
- 1.10.4** In order to undertake the required calculations for the operation of the ambient controlled anti-condensation heaters, a map of probability of temperature and humidity data are as follows:

Table 4. Regional Weather Data

Relative Humidity	RH band mid-point	Probability of ASEAN		
		Probability at 16°C	Probability at 22°C	Probability at 32°C
0-10%	5%	0.0	0.0	0.0
10-20%	15%	0.0	0.0	0.0
20-30%	25%	0.8	0.4	0.0
30-40%	35%	3.3	3.4	0.3
40-50%	45%	6.4	10.7	2.1
50-60%	55%	8.0	14.2	7.8
60-70%	65%	5.8	9.0	11.3
70-80%	75%	2.5	3.9	6.3
80-90%	85%	0.8	0.9	1.8
90-100%	95%	0.0	0.0	0.3

Note: For the calculations, relative humidity shall be set to not less than 50% with a Probability at 32°C.

- 1.10.5** During energy consumption test, the automatic ice maker should be disabled and the water tank or water supply shall be empty.

1.11 Ice-Making Test

- 1.11.1** Ice-Making Capacity = Mass of Water Turned into Ice per Day, in kg/day
- 1.11.2** Supply water temperature shall be 25°C ±1K
- 1.11.3** All test samples shall comply with the minimum requirements of 300g/24hrs ice-making capacity.¹

1.12 Freezing Capacity Test

- 1.12.1** Freezing capacity = mass in kg of light load / freezing time in hours of light load.
- 1.12.2** The initial temperature of light load will be at 25°C ±1 K.
- 1.12.3** The light load to be processed is 3.5 kg/100ℓ of volume compartment operating at not more than -18°C.

1.13 Energy Efficiency Performance Rating (EEPR) of Refrigerating Appliances

- 1.13.1** Refrigerating appliances shall be classified based on its rated EEPR.

¹ In line with ASEAN Harmonization

- 1.13.2 The classification shall be represented by stars, with one (1) star as the lowest and five (5) stars as the highest.
- 1.13.3 All refrigerating appliances shall be classified according to the rated EEF as follows:

Table 5a. EEPR for One Door-Direct Cooling

Classification	EEF Range
One Star	200 to 225
Two Star	226 to 245
Three Star	246 to 320
Four Star	321 to 499
Five Star	500 and Up

Table 5b. EEPR for Two Door-Direct Cooling

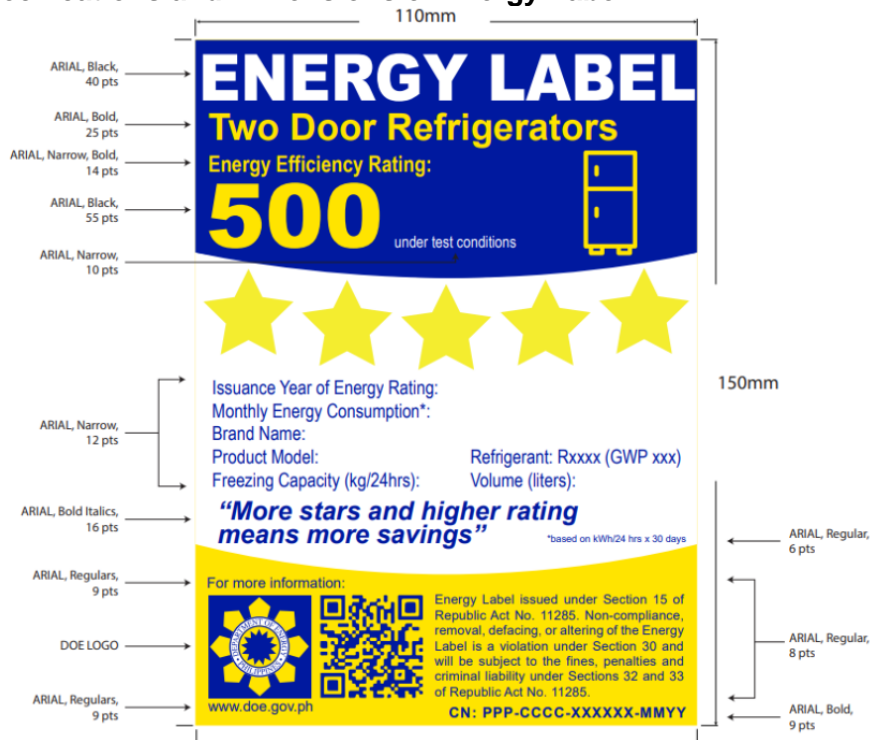
Classification	EEF Range
One Star	230 to 249
Two Star	250 to 270
Three Star	271 to 360
Four Star	361 to 440
Five Star	441 and Up

Table 5c. EEPR for Frost-Free Refrigerator

Classification	EEF Range
One Star	180 to 250
Two Star	251 to 320
Three Star	321 to 370
Four Star	371 to 449
Five Star	450 and Up

Note: Subject to historical data

1.14 Specifications and Dimensions of Energy Label



Swatches



Applicants shall place the energy label at the front of the unit or front of the box displayed for sale.

1.15 Presentation of the Energy Label



1.16 Correction of Performance Ratings

1.16.1 Applicants have the option to downgrade the claimed ratings to comply with the requirements of the standard based on the results of verification test.

1.16.2 New claims shall conform to the tolerances specified in 1.8

2. Code of Practice on Energy Labeling of Products. Pursuant to Section 15 of the EEC Act, the Code of Practice on Energy Labeling of Products (COPE) provides for the calculation methods of the following:

2.1 The Refrigerating Appliances Energy Efficiency Performance Rating (EEPR) or the star rating shown in the DOE Energy Label is based on the **Energy Efficiency Factor (EEF)**, which is calculated as follows:

$$\text{Energy Efficiency Factor (EEF)} = \frac{\text{Total adjusted volume, in liters}}{\text{Energy consumption, in kWh/24h}}$$

Where:

Total adjusted volume = SVff + SVOC;

SVff is the volume of fresh food compartment, expressed in liters;

SVOC is the summation of the volume of other compartments, expressed in liters; = ((K1 x SVOC1) + (K2 x SVOC2) + (K3 x SVOC3)...)

K is the adjustment factor.

Note: The resulting EEF is rounded off to the nearest 0.1 ℓ/kWh. The decision will be based on the rounded-off value.

The test temperature for determination of energy consumption shall be 32°C. E_{daily32°C} will be used. The E_{daily32°C} comprises of Energy at steady state + Energy incurred in load processing.

The **adjustment factor K**, (as seen above) shall be calculated as follows:

$$K = \frac{T1 - Tc}{T1 - TM}$$

Where:

K is the adjustment factor;

T1 is the ambient temperature, °C;

Tc is the compartment temperatures. i.e. frozen food compartment, chiller compartment, etc., °C; and

TM is the fresh food compartment temperature, °C.

Note: Actual temperatures of each compartment shall be used in the above formula

Computation of adjusted storage volumes:

Computation of **adjusted storage volume of frozen food compartment** shall be made using the following equation:

$$FZAV = SVmfz \times KFZ$$

Where:

FZAV is the adjusted volume of frozen food compartment, in liters;

SVmfz is the measured volume of frozen food compartment, in liters; and

KFZ (same formula as **K**) is the adjustment factor

Computation of **adjusted storage volume of chiller compartment** shall be made using the following equation:

$$CCAV = SVMcc \times Kcc$$

Where:

CCAV is the adjusted storage volume of chiller compartment, in liters;

SVMcc is the measured storage volume of chiller compartment, in liters; and

Kcc (same formula as **K**) is the adjustment factor

Computation of **adjusted storage volume of cellar compartment** shall be made using the following equation:

$$CAV = SVmc \times KC$$

Where:

CAV is the adjusted volume of cellar compartment, in liters;

SVmc is the measured volume of cellar compartment, in liters; and

KC (same formula as **K**) is the adjustment factor

Note: The rationale for multiplying each compartment volume by an adjustment factor “K” is that, it takes “K” times as much energy to maintain a given insulated space at -18 °C than it does at +4°C in a 32°C ambient temperature.

Typical refrigerator-freezer models have two temperature zones, a fresh food storage area that operates at about +4°C and a frozen food storage area that operates at about -18°C for a 3-star freezer compartment. To compare, on an equitable basis, a model with a large percentage of its total volume devoted to freezer space, to a model with small percentage of its total volume devoted to a freezer space, an adjustment factor “K” is applied to the freezer volume. This adjustment is the ratio of heat flow through freezer wall to heat flow through an equivalent fresh food wall, which is proportional to the ratio of the temperature difference.

The EEPR reflected on the DOE Energy Label shall correspond to the EEF value shown in the product test report during product registration. The EEPR shall be adjusted accordingly (as needed) once the product has undergone verification testing.

- 2.2** For the estimation of **monthly energy kWh consumption** (based on a specified hour of daily usage), as shown in the DOE Energy Label, the calculation is as follows:

$$\text{Monthly kWh Consumption} = \text{Daily kWh} \times 30$$

Where:

Daily kWh is the measured energy consumption for 24 hours. This corresponds to the value reflected in the product test report during product registration

- 2.3** For the estimation of **monthly electricity cost**, the calculation is as follows:

$$\text{Monthly Electricity Cost} = \text{Monthly kWh Consumption} \times \text{Electricity Price}$$

Where:

Electricity Price is the prevailing peso per kWh, as indicated in the electricity bill issued by an electric power distribution company.

2.4 For the estimation of **monthly Greenhouse Gas (GHG) emission** due to monthly electricity consumption, the calculation is as follows:

$$\text{Monthly GHG emission} = \text{Monthly kWh Consumption} \times \text{Emission Factor}$$

Where:

Emission Factor is the Simple Operating Margin (OM) Emission Factor derived using the power grid statistics and is available in the DOE Website.

The unit of the calculated GHG emission shall be in kg CO₂.

3. Refrigerating Appliances Product Registration. Only registered companies can proceed to the per-model PELP Online Product Registration, applicable to both manufactured and imported institutional products, using Product Registration Form – Refrigerating Appliances as shown below and available online.

Product Registration Form – Refrigerating Appliances

Product	Refrigerating Appliances
Particular Product	<input type="checkbox"/> Ref Variable (RFV) <input type="checkbox"/> Ref Fixed (RFF)
Type	<input type="checkbox"/> Manual Defrost <input type="checkbox"/> Frost-Free <input type="checkbox"/> Refrigerator-Freezer
Brand Name	
Model Number/Code	
Year Model	
Country of Origin	
Original Equipment Manufacturer	
Is the product generic to a base model?	<input type="checkbox"/> Yes <input type="checkbox"/> No Please specify base model: _____
Volume (L)	
No. of Doors	
Energy Consumption (kWh/24h)	
Energy Efficiency Factor (EEF)	
Global Warming Potential (GWP) of Refrigerant	
General List of Refrigerants	<input type="checkbox"/> HCFC-123 <input type="checkbox"/> R-407A <input type="checkbox"/> R-408A <input type="checkbox"/> R-407C <input type="checkbox"/> R-409A <input type="checkbox"/> R-407F <input type="checkbox"/> AK-225 <input type="checkbox"/> R-410A <input type="checkbox"/> H-997 <input type="checkbox"/> R-417A <input type="checkbox"/> R-412A <input type="checkbox"/> R-422A <input type="checkbox"/> R-23 <input type="checkbox"/> R-438A <input type="checkbox"/> R-32 <input type="checkbox"/> R-449A <input type="checkbox"/> R-134A <input type="checkbox"/> R-452A <input type="checkbox"/> R-227EA <input type="checkbox"/> R-4310 (HFC-43- <input type="checkbox"/> R-236FA 10mee) <input type="checkbox"/> R-245FA <input type="checkbox"/> R-507 <input type="checkbox"/> R-365mfc

	<input type="checkbox"/> R-404A <input type="checkbox"/> R-508 <input type="checkbox"/> R-513A
No. of Stars	<input type="checkbox"/> ★ <input type="checkbox"/> ★★ <input type="checkbox"/> ★★★ <input type="checkbox"/> ★★★★ <input type="checkbox"/> ★★★★★
Other Parameters	

*Note: Number of samples tested for product registration purposes will be up to the Applicant.
The validity of the test report shall be one (1) and a half year.*

4. **Effectivity.** This Refrigerating Appliances IG shall take effect fifteen (15) days following its publication in at least two (2) newspapers of general circulation. Copies of this IG shall be filed with the University of the Philippines Law Center – Office of the National Administrative Register.

Issued at Energy Center, Bonifacio Global City, Taguig City.

Approved by:

PATRICK T. AQUINO, CESO III
 Director, Energy Utilization Management Bureau