Republic of the Philippines
Department of Science and Technology
INDUSTRIAL TECHNOLOGY DEVELOPMENT INSTITUTE
DOST Cpd., General Santos Ave., Bicutan, Taguig City
Tel. Nos. : 837-2071 to 82 (DOST Trunklines) Telefax No.: 837-3167
http://www.itdi.dost.gov.ph

Reference No.: ETV-19-015

February 17, 2020

MR. YOSHIAKI HEMMI
President
Green Earth Co., Ltd.
7-13-8 Okamoto, Higashi-Nada, Kobe,
Japan 6-58-0072

Subject: ETV Statement and Report of **HB AIR-CONDITIONING SYSTEM**

Dear Mr. Hemmi:

We are transmitting herewith a copy of the Environmental Technology Verification Statement and Report of **HB Air-conditioning System**.

The ETV Statement is the result of an impartial, consensus-based approach to evaluating innovative environmental technology in accordance with the ETV Protocol. The data presented are believed accurate and the analyses credible. The statements made and conclusions drawn regarding the product evaluated do not, however, amount to an endorsement or approval of the product in general or for any particular application nor warranty to the performance of the technology that it will always operate as verified.

We would like to reiterate that the ETV Statement must only be distributed/reproduced/quoted in full. No portion may be presented partially.

Thank you very much.

Sincerely yours,

/In response
Dr. ANNABELLE V. BRIONES
Director

Republic of the Philippines
Department of Science and Technology
INDUSTRIAL TECHNOLOGY DEVELOPMENT INSTITUTE
DOST Cpd., General Santos Ave., Bicutan, Taguig City
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ENVIRONMENTAL TECHNOLOGY VERIFICATION (ETV)

VERIFICATION STATEMENT

TECHNOLOGY TYPE: **Air-conditioning System Retrofit Kit**

APPLICATION: **Conventional Split Type Air-conditioner**

TECHNOLOGY NAME: ***HB Air-conditioning System (ETV 19-015)***

COMPANY: **Green Earth Co., Ltd.**

DATE: **February 2020**

Disclaimer

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This ETV Statement is based from an evaluation activity supported by the DOST-ITDI ETV Group, the Panel of Experts and Green Earth Co., Ltd.

Mention of commercial product name does not imply endorsement.

Republic of the Philippines
Department of Science and Technology
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http://www.itdi.dost.gov.ph

ENVIRONMENTAL TECHNOLOGY VERIFICATION REPORT ON THE

HB AIR-CONDITIONING SYSTEM

(ETV 19-015)

Prepared by:

The Environmental Technology Verification (ETV) Group
Cleaner Production Section, Environment & Biotechnology Division
Industrial Technology Development Institute
Department of Science and Technology
Gen. Santos Avenue, Bicutan, Taguig
1631 Metro Manila

For:

Green Earth Co., Ltd.
7-13-8 Okamoto, Higashi-Nada, Kobe,
Japan 6-58-0072

February 2020

This report is the result of an impartial, consensus-based approach to evaluating innovative environmental technology in accordance with the ETV Technical Protocol. The data presented are believed accurate and the analyses credible. The statements made and conclusions drawn regarding the product evaluated do not, however, amount to an endorsement or approval of the product in general or for any particular application nor a warranty to the performance of the technology that it will always operate as verified.

Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the Authors and do not necessarily reflect the view of the Department of Science and Technology. Mention of commercial product name does not imply endorsement.

1.0 INTRODUCTION

The Department of Environment and Natural Resources (DENR) – Department of Science and Technology (DOST) Joint Administrative Order (AO) No. 01, Series of 2006 on Adopting Environmental Technology Verification (ETV) Protocol covers the technology review and verification of process of new and modified technology for the following:

- Use of technology in treatment, storage and disposal of wastes
- Use of technology in pollution control and abatement
- Best environmental technology
- Cleaner production technologies

Section 5 of the Joint AO states that "The DENR shall no longer process and approve applications for Technology Approval. All applications for technology approval and review shall be subject to the Technology Protocol on Environmental Technology Verification of the DOST thru its Industrial Technology Development Institute."

Likewise, the Department of Energy (DOE) recognizes the DOST's ETV Program and concurs that new and modified technologies related to energy savings and anti-air pollution be subjected to ETV upon request by technology proponents. The DOE supports the ETV Program by providing experts that will review and verify this type of technologies.

ETV is the process of developing and implementing a real-world test and demonstration to verify or prove the performance of a particular technology with regards to all relevant parameters. ETV aims to evaluate the performance of environmentally sound technologies (EST), whether it operates effectively based on the claims of technology suppliers, under defined conditions during the assessment stage. It also assesses whether a certain technology reduces wastes and manufacturing costs, and if it minimizes risks to humans and the environment.

The Environmental Technology Verification (ETV) Group of the Department of Science and Technology (DOST) is tasked with the implementation of the ETV Protocol. The ETV group provided technical and logistical support to the ETV Panel of Experts in the development and implementation of the Test Plan for the verification of the claims of Green Earth Co. Ltd., for its technology, the *HB AIR-CONDITIONING SYSTEM*.

This report documents the tests conducted for the verification of the environmental performance of the *HB AIR-CONDITIONING SYSTEM*. The report outlines the description of the technology and the objectives of the ETV; verification methodology; and the evaluation of results.

2.0 DESCRIPTION OF THE TECHNOLOGY AND OBJECTIVE OF ETV

This section provides for the discussion of the technology and its claim that was validated in the conduct of the ETV.

2.1 Description of the Technology

The description given below is based on the technical information supplied by Green Earth Co., Ltd., and does not represent verified information.

The HB Air-conditioning System is an environment-friendly air-conditioning system made by modifying a conventional air-conditioning unit, which entails the use of the Supercondenser component (SUPACON).

The HB Air Conditioning System is essentially made of two components:

1. *The SUPACON is a proprietary super condenser composed of especially designed aluminum fins coated with nanoceramic paint. The aluminum fins are designed to have high surface area, allowing more efficient heat exchange. The SUPACON is installed onto the condensing unit of an existing air-conditioning system, as an extension, adding heat exchange surface area, thereby improving the cooling of absorbed hot air.*

2. *The HB Refrigerant is a new refrigerant resulting from a mixture of previously existing R32 and R134a refrigerants. The resulting new refrigerant is non-toxic and non-flammable; it exhibits low global warming potential index (GWP) and 0% ozone depletion potential (ODP) similar to its original components. The HB Refrigerant is used to replace the refrigerant in the existing air-conditioning system.*

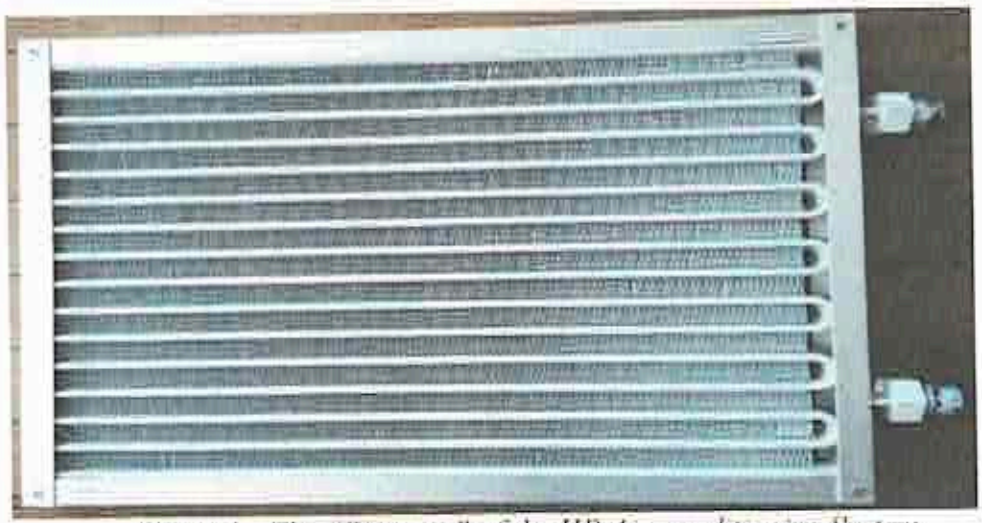


Figure 1. *The "Supacon" of the HB Air-conditioning System*

2.2 Objectives of the ETV

The ETV Panel of Experts and the technology supplier agreed to validate the claim that the HB Air-conditioning System improves the energy efficiency of the conventional air-conditioning units by up to 25%.

3.0 VERIFICATION METHODOLOGY

This Section describes the methodology and the parameters employed in validating the claims of the technology. It includes a description of the experimental design for testing the validity of the claims stated in Section 2.2.

3.1 Unit Under Test

The ETV technical panel members and representatives from Green Earth Co., Ltd., conducted a random sampling where one (1) brand new unit of Carrier Split Type Wall Mounted air conditioner was drawn and purchased from Abenson-Waltermart in Makati, Metro Manila. The summary of the characteristics of the test unit as purchased is presented in Table 1, while Figure 2a and 2b shows the evaporator and condenser units that were used during the tests. Meanwhile, Figure 3 shows the installation of the HB Air-conditioning System.

Table 1. Test Unit Specification

Carrier Split Type Wall Mounted	Model 42CGF009308/38CGF009308-1
Indoor Unit Serial Number	42CGF009308-1
Outdoor Unit Serial Number	38CGF009308-1
Input Voltage, V	230
Operating Current, A	3.6
Input Power, W	810
Frequency, Hz	60
Cooling Capacity, kJ/h	9 600
Energy Efficiency Ratio, kJ/h-W	11.9

Figure 2a. Indoor Unit Under Test **Figure 2b.** Outdoor Unit Under Test

Figure 3. Installation of HB Air-conditioning System

3.2 Verification of the claim that the HB Air-conditioning System improves the energy efficiency of the conventional air-conditioning units by up to 25%

The indoor air enthalpy method described in the Philippine National Standard (PNS) 240:1998/ISO 5151:1994 "Non-ducted Air Conditioners and Heat Pumps-Testing and Rating for Performance" was applied in this verification test. In this method, the relative humidity and the temperature of the air will be measured at the inlet (return) and outlet (supply) of the indoor section of the AC. The air flowrate through the indoor section (see Figure 3) will also be measured in this method. Test conditions for the determination of cooling capacity were based on T1 climate, Clause 4, Table 1 of the same standard as illustrated in Table 2, below.

The test was conducted in two parts: the first part was the baseline testing and the second part was the actual verification test with HB Air Conditioning System equipped to the test unit.

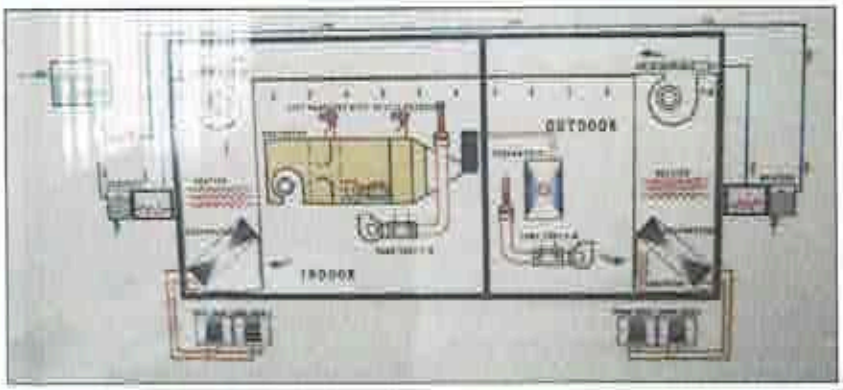


Figure 3. Layout of the psychrometric-type calorimeter

Table 2: Standard Test Conditions for Moderate (T1) Climate

Parameters	Value
Indoor, dry-bulb, °C	27.0
wet-bulb, °C	19.0
Outdoor, dry-bulb, °C	35.0
wet-bulb, °C	24.0
Test Frequency, Hz	60
Test Voltage, V	230

The test unit was mounted at the psychrometric-type calorimeter chamber in accordance with the instructions enclosed with the unit's manual by an authorized installer. The temperature control of the test unit was positioned at the "coldest" setting and the fan motor in the "high speed" position. Stable or steady state test conditions were maintained for two (2) hours before starting the capacity test data recording. The capacity tests lasted for not less than thirty-five (35) minutes with readings taken every five (5) minutes for a total of 7 readings. The average test data was compared to the criteria for the minimum EER and tolerances for cooling capacity, input power and EER as reflected in PNS 396 Part 1:1998 "Household Appliances-Energy Efficiency Ratio (EER) and Labeling Requirements Part 1: Room Air Conditioners" as seen in Table 3.

Table 3. Criteria for EER and Tolerance Limit

Parameters	Criteria for EER and Tolerance
Cooling Capacity	Measured value must not be less 90% of the claimed value
Input Power	Measured value must not exceed 110% of the claimed value
EER	Measured value must not be less than 90% of the claimed value

4.0 EVALUATION OF TEST RESULTS

This section discusses the results and data obtained from the psychrometric-type calorimeter. All raw data are attached in the Annex.

Verification of the claim that the HB Air-conditioning System improves the energy efficiency of the conventional air-conditioning units by up to 25%

Shown in Table 4 are the results of the performance testing conducted by Omni Solid Services, Inc., Solid Test Laboratory from December 10 to 11, 2019.

Table 4. Results of the Performance Testing of Carrier Split Type Wall Mounted

Model: 42CGF009308/38CGF 009308-1	(a) Without Super Condenser R410A	(b) With Super Condenser HB 366	Rated	Actual /Rated		% Variation (b-a)/a x 100
				Without Super Condenser R410A	With Super Condenser HB 366	
Cooling Capacity, kJ/h	9 738.6	9 327.4	9 600	101.44%	97.1%	(4.28)
Input Power, W	855.7	742.4	810	105.64%	91.66%	(13.24)
EER, kJ/h-W	11.381	12.564	11.9	95.64%	105.58%	10.39

The actual performance of the Carrier Split Type Wall Mounted retrofitted with the HB Air-conditioning System was within the tolerances of the rated value for cooling capacity, input power and EER as reflected in PNS 396 Part 1:1998 "Household Appliances-Energy Efficiency Ratio (EER) and Labeling Requirements Part 1: Room Air Conditioners" as shown in Table 4.

Based on the results of the tests conducted for the verification of the claim of Green Earth Co., Ltd., it has been verified that the installation of the HB Air-conditioning System to the Carrier Split Type Wall Mounted Airconditioner Model: 42CGF009308/38CGF009308-1 resulted in the following under T1 Climate condition:

- ***Cooling capacity was reduced from 9,738.6kJ/h to 9,327.4kJ/h, exhibiting about 4.28% decrease in cooling capacity***
- ***Input power was reduced from 855.7W to 742.4W or by about 13.24%***
- ***Energy Efficiency Ratio (EER) was increased from 11.382kJ/h-W to 12.564kJ/h-W or by about 10.39%***
- ***Cooling capacity, input power and EER are within the standards reflected in PNS 396 Part 1:1998 "Household Appliances-Energy Efficiency Ratio (EER) and Labeling Requirements Part 1: Room Air Conditioners"***

ANNEX

ACTUAL PERFORMANCE TEST RESULTS

OMNI SOLID SERVICES, INC.
SOLID TEST LABORATORY
2000 East Service Rd, Bicutan
Parañaque City 1700 Philippines
Tel. No. 837-0195 to 98 Loc 218 & 219
Direct Lines: 838-3048; 838-7965

PAB ACCREDITED
TESTING LABORATORY
PNS ISO/IEC 17025 2005
LA-2005-064D

TEST REPORT
ISO 5151 : 1994
Part 1 : Non-ducted Air Conditioners and Heat pumps - Testing and rating for performance

Control No.	**TR-NAR4AP-19-01-A**
Date Received	December 07 2019
Date Tested	December 9-11, 2019
Date Issued	December 13 2019
Purpose	(✓) For Testing ( ) For Verification

GENERAL: (✓) Base ( ) Generic ( ) Mechanical Control (✓) Remote Control

Client	NARED CO - Natures Renewable Energy Development Corp.
Manufacturer / Importer	**NARED CO - Natures Renewable Energy Development Corp.**
Address	Penthouse Bldg. III, Sta. Lucia East Grand Mall, Marcos Highway corner Felix Avenue, Cainta 1900 Rizal

Type of test object	SPLIT TYPE WALL MOUNTED
Brand	**CARRIER**
Model Tested	42CGF009308-1/38CGF009308-1
Serial Number	340716...70375/340894...70085
Power Supply Rating(V,Hz,A,Ph)	230V~ 60Hz 3.6A 1Ph
Rated Cooling Capacity (kj/hr)	9,600
Rated Power Input (watts)	810
Rated EER (kj/watt-hr)	11.9
Refrigerant / Amount	R410A/HB366
Reference Standard/s	ISO 5151 : 1994

Tested by: **Fernan B. Gerona**
Test Engineer

Reviewed by: **Rainier A. Arnaiz**
Senior Test Engineer

Approved by: **Johnny A. Quinto**
Laboratory Manager

Solid Testing Laboratory
DATA SHEET

Started Time: 2019-12-10 11:42:09 AM

Brand Name: CARRIER	Unit Model NO.: 42CGF009308-1/38CGF009308-1	Serial NO.: [illegible]

Condition: Cooling Capacity: [illegible] Rated Capacity: [illegible] Test NO.: TR-NAR4AP-19-01-A
Rated Power: 815 Rated EER: [illegible] Power: ON/OFF

Item		Unit	1	2	3	4	5	6	7	Average
Electrical Characteristic	Voltage	V	230.0	230.1	229.9	230.0	229.9	230.0	230.0	230.0
	Current	A	3.76	3.75	3.77	3.77	3.78	3.77	3.77	3.77
	Wattage	W	854.4	851.8	858.6	856.5	858.2	856.5	857.4	855.7
	Power measured	%	105.35	105.10	100.76	100.68	100.95	100.74	100.85	100.84
	Power Factor	%	98.78	98.80	98.78	98.78	98.78	98.80	98.79	98.79
	Frequency	Hz	59.99	59.99	59.88	59.99	59.99	59.99	59.99	59.99
System Pressures	Refrigerant Pressure(High)	MPa								
	Refrigerant Pressure(Low)	MPa								
System Temperatures	EVAP IN	°C	10.51	10.47	10.50	10.52	10.47	10.47	10.41	10.48
	EVAP OUT	°C	9.04	9.01	9.09	9.12	9.05	9.06	9.01	9.06
	AIR DISCHARGE	°C	13.10	13.09	13.13	13.12	13.07	13.06	13.07	13.09
	TC 04	°C								
	TC 05	°C								
	TC 06	°C								
	TC 07	°C								
	TC 08	°C								
	TC 09	°C								
	TC 10	°C								
	TC 11	°C								
	TC 12	°C								
	TC 13	°C								
	TC 14	°C								
	TC 15	°C								
	TC 16	°C								
	TC 17	°C								
	TC 18	°C								
	SUCTION	°C	8.78	8.75	8.82	8.82	8.87	8.81	8.82	8.81
	DISCHARGE	°C	74.93	74.32	74.70	75.02	75.12	75.34	75.36	74.83
	CONDENSER IN	°C	71.95	72.03	73.43	72.69	73.78	72.38	72.99	72.56
	CONDENSER OUT	°C	35.81	35.78	35.75	35.72	35.78	35.97	35.75	35.79
	C. AIR DISCHARGE	°C	42.43	42.40	42.46	42.58	42.54	42.51	42.57	42.50
	C. LOW SIDE	°C	8.58	8.55	8.63	8.60	8.64	8.63	8.58	8.61
	TC 25	°C								
	TC 26	°C								
	TC 27	°C								
	TC 28	°C								
	TC 29	°C								
	TC 30	°C								
	TC 31	°C								
	TC 32	°C								
	TC 33	°C								
	TC 34	°C								
	TC 35	°C								
	TC 36	°C								
Indoor	Air Entering Temp. D.B	°C	27.10	26.98	27.02	27.01	26.97	27.01	26.99	27.01
	Air Entering Temp. W.B	°C	19.05	18.97	19.00	19.09	18.95	19.01	19.00	19.00
	Enthalpy Air Entering	KJ/kg	54.277	54.093	54.248	54.281	54.054	54.259	54.193	54.196
	Air Leaving Temp. D.B (I.D.)	°C	14.58	14.56	14.59	14.61	14.53	14.57	14.57	14.57
	Air Leaving Temp. W.B (I.D.)	°C	13.26	13.21	13.25	13.27	13.19	13.23	13.23	13.24
	Enthalpy Air Leaving	KJ/kg	37.535	37.506	37.522	37.571	37.458	37.470	37.467	37.474
	Enthalpy Differential	KJ/kg	16.74	16.76	16.73	16.71	16.68	16.77	16.73	16.72
	Specific Density	kg/m3	1.213	1.213	1.212	1.212	1.212	1.212	1.212	1.212
	Static Pressure	Pa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Nozzle Diff. Pressure	Pa	414.45	416.42	417.69	417.56	417.57	413.43	415.17	416.05
	Barometric Pressure	kPa	100.73	100.71	100.70	100.69	100.69	100.67	100.67	100.69
Outdoor	Air Leaving Temp. D.B (O.D.)	°C	35.00	34.99	35.02	34.99	34.98	35.01	34.99	35.00
	Air Leaving Temp. W.B (O.D.)	°C	24.00	23.99	24.01	24.00	24.01	24.02	24.00	24.00
Test Data	Air Volume	m3/min	7.84	7.87	7.91	7.87	7.87	7.83	7.85	7.86
	Cooling Capacity	KJ/h	9464.42	9462.71	9497.68	9479.54	9462.67	9487.51	9461.94	9472.19
	Sensible Cooling Capacity	KJ/h	7539.4	7547.0	7516.5	7542.5	7544.9	7553.1	7532.7	7545.2
	Code Tester Heat Loss	KJ/h	269.73	268.40	268.36	267.91	268.73	269.69	268.33	268.48
	Latent Heat Capacity	KJ/h	2193.7	2184.1	2203.8	2209.3	2100.9	2203.1	2197.6	2193.5
	Total Cooling Capacity	KJ/h	9733.2	9731.1	9769.3	9747.0	9731.4	9756.4	9730.3	9738.6
	Recooling capacity measured	%	101.39	101.37	101.67	101.64	101.37	101.42	101.30	101.44
	E.E.R	KJ/hW	11.402	11.424	11.384	11.387	11.350	11.388	11.346	11.391
	%EER measured	%	95.85	96.00	95.75	95.69	95.52	95.53	95.37	95.84
	Moisture Removal Capacity	Liters/hr	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Input Data	Refrigerant pressure (High)			Before Fan Motor speed control			Before Fan Motor speed control			
	Outdoor Fan Motor Speed(rpm)			Before Fan Motor speed control			After Fan Motor speed control			

2019-12-10	Ferrer B. Garcia, Test Engineer	Reinier A. Arriola, Senior Test Engineer	Johnny A. Quinto, Laboratory Manager	WITHOUT SUPER CONDENSER R410A
Test Date	Tested By	Checked / Witnessed By	Approved By	Remarks

Solid Testing Laboratory
DATA SHEET

Started Time: 2019-12-10 2:48:56 PM

Brand Name: **CARRIER** | Unit Model NO.: 42CGF009308-1/38CGF009308-1 | Serial NO.: [illegible]

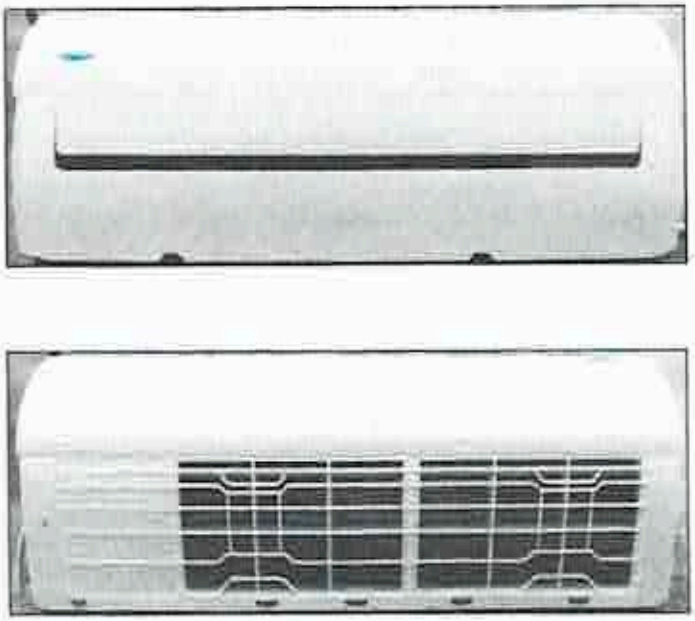
Condition: Cooling Capacity Full | Rated Capacity (kJ/h): 9330 | Test NO.: TR-NAR4AP-19-01-A
Rated Power (W): [illegible] | Rated EER (kJ/h.W): 11.3 | Nozzle: [illegible]

Item		Units	1	2	3	4	5	6	7	Average
Electrical Characteristics	Voltage	V	220.9	220.9	220.9	220.8	220.9	220.9	220.9	220.9
	Current	A	4.32	4.31	4.32	4.31	4.32	4.31	4.31	4.31
	Wattage	W	981.8	979.3	981.0	979.9	980.1	979.5	979.7	980.1
	%power measured	%	121.21	120.89	121.11	120.98	121.00	120.92	120.95	121.00
	Power Factor	%	98.82	98.84	98.82	98.83	98.82	98.84	98.82	98.83
	Frequency	Hz	59.99	59.99	59.99	59.99	59.99	59.99	59.99	59.99
System Pressures	Refrigerant Pressure(Hi)de	MPa								
	Refrigerant Pressure(Lo)de	MPa								
System Temperatures	EVAP IN	°C	12.49	12.49	12.50	12.49	12.47	12.49	12.47	12.48
	EVAP OUT	°C	10.85	10.85	10.86	10.85	10.83	10.84	10.83	10.84
	AIR DISCHARGE	°C	14.32	14.31	14.33	14.33	14.29	14.31	14.31	14.31
	TC 04	°C								
	TC 05	°C								
	TC 06	°C								
	TC 07	°C								
	TC 08	°C								
	TC 09	°C								
	TC 10	°C								
	TC 11	°C								
	TC 12	°C								
	TC 13	°C								
	TC 14	°C								
	TC 15	°C								
	TC 16	°C								
	TC 17	°C								
	TC 18	°C								
	SUCTION	°C	10.39	10.39	10.41	10.43	10.38	10.40	10.41	10.40
	DISCHARGE	°C	85.83	85.80	85.79	85.80	85.73	85.70	85.71	85.76
	CONDENSER IN	°C	83.50	83.50	83.49	83.53	83.51	83.48	83.48	83.51
	CONDENSER OUT	°C	47.27	47.18	47.28	47.22	47.29	47.23	47.29	47.25
	O. AIR DISCHARGE	°C	52.91	52.79	52.90	52.00	52.89	52.88	52.88	52.87
	O. LOW SIDE	°C	10.26	10.25	10.25	10.29	10.27	10.28	10.27	10.27
	TC 25	°C								
	TC 26	°C								
	TC 27	°C								
	TC 28	°C								
	TC 29	°C								
	TC 30	°C								
	TC 31	°C								
	TC 32	°C								
	TC 33	°C								
	TC 34	°C								
	TC 35	°C								
	TC 36	°C								
Indoor	Air Entering Temp. D.B	°C	26.98	26.99	27.00	27.00	27.00	27.00	27.00	27.00
	Air Entering Temp. W.B	°C	18.99	19.00	19.00	19.00	19.00	19.00	19.00	19.00
	Enthalpy Air Entering	kJ/kg	54.212	54.248	54.255	54.272	54.267	54.274	54.259	54.257
	Air Leaving Temp. D.B (I.D.)	°C	15.36	15.35	15.36	15.36	15.36	15.35	15.35	15.36
	Air Leaving Temp. W.B (I.D.)	°C	14.03	14.02	14.03	14.04	14.03	14.03	14.03	14.03
	Enthalpy Air Leaving	kJ/kg	39.627	39.609	39.642	39.674	39.652	39.646	39.638	39.641
	Enthalpy Differential	kJ/kg	14.58	14.64	14.61	14.60	14.62	14.63	14.63	14.62
	Specific Density	kg/m3	1.206	1.206	1.206	1.205	1.206	1.206	1.206	1.206
	Static Pressure	Pa	0.0	0.0	0.0	0.0	0.0	-2.0	0.0	0.0
	Nozzle Diff. Pressure	Pa	409.39	406.89	408.12	409.66	407.69	408.30	406.98	408.02
	Barometric Pressure	kPa	100.50	100.50	100.50	100.49	100.48	100.48	100.49	100.49
Outdoor	Air Leaving Temp. D.B (O.D.)	°C	46.01	46.00	45.99	46.01	45.99	46.00	46.00	46.00
	Air Leaving Temp. W.B (O.D.)	°C	28.99	28.99	29.00	29.00	29.00	29.01	29.00	29.00
Test Data	Air Volume	m3/min	7.81	7.75	7.80	7.80	7.79	7.80	7.79	7.80
	Cooling Capacity	kJ/h	8166.72	8172.34	8169.70	8166.88	8166.62	8179.30	8168.11	8169.95
	Sensible Cooling Capacity	kJ/h	6971.5	6969.0	6966.1	6971.4	6961.6	6972.1	6961.1	6966.3
	Code Tester Heat Loss	kJ/h	251.30	251.69	251.47	251.51	251.44	251.64	251.63	251.51
	Latent Heat Capacity	kJ/h	1446.5	1464.0	1455.1	1447.0	1456.5	1458.8	1458.8	1455.2
	Total Cooling Capacity	kJ/h	8418.0	8423.0	8421.2	8418.4	8418.1	8430.9	8419.7	8421.5
	%cooling capacity measured	%	87.69	87.75	87.72	87.69	87.69	87.82	87.71	87.72
	E.E.R	kJ/h.W	8.574	8.600	8.584	8.591	8.589	8.604	8.594	8.593
	%EER measured	%	72.05	72.29	72.14	72.26	72.17	72.30	72.22	72.21
	Moisture Removal Capacity	L/hr	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
Input Data	Refrigerant amount (L)comp		Indoor Fan Motor Speed (r/min)			Capillary Pressure Drop (1) Remarks				
	Outdoor Fan Motor Speed(r/min)		Indoor Fan Motor Speed (r/min)			[illegible]				

2019-12-10	Fernan B. Gerona Test Engineer	Rainier A. Arnaiz Senior Test Engineer	Johnny A. Quinto Laboratory Manager	WITHOUT SUPER CONDENSER R410A
Test Date	Tested By:	Checked / Witnessed By:	Approved By:	Remarks:

F-TLD-1441A Rev.2

UNIT UNDER TEST



Indoor

Outdoor

Solid Testing Laboratory
DATA SHEET

Started Time: 2019-12-11 11:36:16 AM

Brand Name:	CARRIER	Unit Model NO.: 42CGF009308-1/38CGF009308-1			Serial NO.: 343756-70373/340394-70385				
		Condition	Cooling Capacity (%)			Rated Capacity (kJ/h): 9500		Test NO.: TR-NAR4AP-19-01-A	
			Rated Power (W): 815			Rated EER (kJ/h/W): 11.5		Nozzle: 80	
	Item	Unit	1	2	3	4	5	6	7	Average

	Item	Unit	1	2	3	4	5	6	7	Average
Electrical Characteristic	Voltage	V	230.0	230.1	230.0	230.0	229.9	230.1	230.0	230.0
	Current	A	3.27	3.27	3.27	3.27	3.28	3.27	3.27	3.27
	Wattage	W	742.5	742.7	741.8	743.3	742.3	741.3	742.9	742.4
	%power measured	%	91.67	91.09	91.59	91.77	91.64	91.51	91.72	91.66
	Power Factor	%	98.71	98.71	98.72	98.73	98.71	98.69	98.71	98.71
	Frequency	Hz	59.99	59.99	59.99	59.99	59.99	59.99	59.99	59.99
System Pressures	Refrigerant Pressure(Side1)	MPa								
	Refrigerant Pressure(Side2)	MPa								
System Temperatures	EVAP IN	°C	9.29	9.31	9.32	9.32	9.28	9.33	9.30	9.32
	EVAP OUT	°C	11.35	11.33	11.37	11.38	11.32	11.36	11.40	11.36
	AIR DISCHARGE	°C	13.81	13.88	13.86	13.85	13.81	13.82	13.85	13.83
	TC 04	°C								
	TC 05	°C								
	TC 06	°C								
	TC 07	°C								
	TC 08	°C								
	TC 09	°C								
	TC 10	°C								
	TC 11	°C								
	TC 12	°C								
	TC 13	°C								
	TC 14	°C								
	TC 15	°C								
	TC 16	°C								
	TC 17	°C								
	TC 18	°C								
	SUCTION	°C	11.44	11.46	11.45	11.49	11.40	11.45	11.49	11.46
	DISCHARGE	°C	77.09	77.09	77.09	77.07	77.03	77.05	77.05	77.07
	CONDENSER IN	°C	73.21	73.24	73.25	73.21	73.23	73.22	73.23	73.23
	CONDENSER OUT	°C	41.01	41.03	40.98	41.03	40.95	41.04	41.06	41.01
	O. AIR DISCHARGE	°C	42.56	42.60	42.53	42.59	42.63	42.61	42.63	42.58
	O. LOW SIDE	°C	11.16	11.11	11.09	11.11	11.10	11.13	11.16	11.12
	SC IN	°C	40.31	40.32	40.27	40.33	40.28	40.30	40.36	40.31
	SC OUT	°C	37.06	37.08	37.01	37.07	36.98	37.10	37.12	37.06
	AIR INTAKE OU	°C	38.45	38.38	38.41	38.47	38.38	38.48	38.48	38.45
	TC 28	°C								
	TC 29	°C								
	TC 30	°C								
	TC 31	°C								
	TC 32	°C								
	TC 33	°C								
	TC 34	°C								
	TC 35	°C								
	TC 36	°C								
Indoor	Air Entering Temp. D.B.	°C	27.01	27.01	27.00	27.01	27.01	26.99	26.99	27.00
	Air Entering Temp. W.B.	°C	19.00	19.00	19.00	19.01	19.00	18.99	19.01	19.00
	Enthalpy Air Entering	kJ/kg	54.194	54.183	54.199	54.219	54.186	54.172	54.232	54.198
	Air Leaving Temp. D.B.(I.D.)	°C	15.07	15.07	15.07	15.07	15.05	15.04	15.06	15.06
	Air Leaving Temp. W.B.(I.D.)	°C	13.74	13.74	13.74	13.73	13.73	13.72	13.74	13.73
	Enthalpy Air Leaving	kJ/kg	38.807	38.807	38.805	38.827	38.776	38.763	38.824	38.802
	Enthalpy Differential	kJ/kg	15.39	15.38	15.39	15.39	15.41	15.41	15.41	15.40
	Specific Density	kg/m³	1.210	1.210	1.210	1.210	1.210	1.210	1.210	1.210
	Static Pressure	Pa	0.0	-0.0	0.0	0.0	0.0	-0.0	-0.0	0.0
	Nozzle Diff. Pressure	Pa	452.61	452.07	451.88	452.84	445.34	456.94	451.19	451.43
	Barometric Pressure	kPa	100.99	100.08	100.68	100.67	100.67	100.66	100.66	100.67
Outdoor	Air Leaving Temp. D.B.(O.D.)	°C	34.99	35.00	35.01	35.00	35.00	35.01	34.99	35.00
	Air Leaving Temp. W.B.(O.D.)	°C	23.98	24.01	24.00	24.02	24.00	23.99	24.00	24.00
Test Data	Air Volume	m³/min	8.20	8.20	8.19	8.20	8.17	8.18	8.19	8.19
	Cooling Capacity	kJ/h	9076.29	9064.48	9064.00	9081.09	9055.83	9072.01	9072.78	9069.47
	Sensible Cooling Capacity	kJ/h	7530.9	7520.3	7513.1	7531.9	7512.8	7518.3	7510.3	7520.9
	Code Tester Heat Loss	kJ/h	257.96	257.55	257.60	257.95	258.26	258.01	257.97	257.95
	Latent Heat Capacity	kJ/h	1803.4	1799.0	1808.7	1807.1	1801.1	1811.7	1820.1	1806.8
	Total Cooling Capacity	kJ/h	9334.2	9322.0	9321.8	9339.0	9313.9	9330.0	9330.5	9327.4
	%cooling capacity measured	%	97.23	97.11	97.10	97.28	97.02	97.19	97.12	97.19
	E.E.R.	kJ/h/W	12.571	12.550	12.565	12.564	12.548	12.587	12.559	12.564
	%EER measured	%	105.64	105.48	105.59	105.58	105.45	105.77	105.53	105.58
	Moisture Removal Capacity	L/hr	0.73	0.73	0.73	0.73	0.73	0.73	0.74	0.73
Input Data	Refrigerant Amount (L2~9.5)		Indoor Fan Motor Speed(1) (rpm)				Outdoor Fan Motor Speed(1) (rpm)			
	Outdoor Fan Motor Speed (rpm)		Indoor Fan Motor Speed(2) (rpm)				Outdoor Fan Motor Speed(2) (rpm)			

2019-12-11	Feman B. Gerona Test Engineer	Rainier A. Amaiz Senior Test Engineer	Johnny A. Quinto Laboratory Manager	WITH SUPER CONDENSER HB366
Test Date	Tested By:	Checked / Witnessed By:	Approved By:	Remarks:

F-TLD-14-01A Rev.2

ETL PHILIPPINES

Solid Testing Laboratory
DATA SHEET

Started Time: 2019-12-11 8:28:13 PM

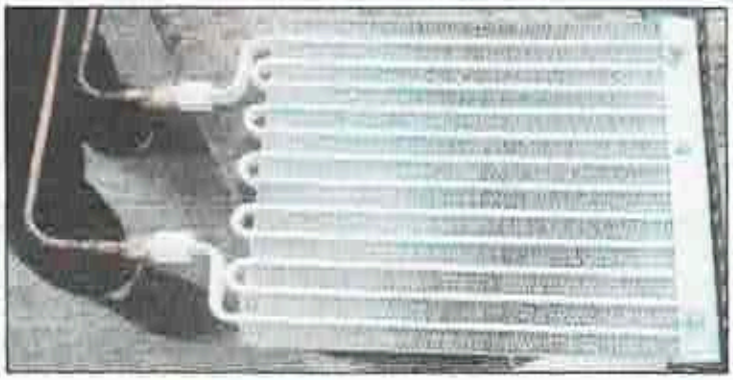
Brand Name: CARRIER	Unit Model NO.: 42CGF009308-1/38CGF009308-1	Serial NO.: [illegible]

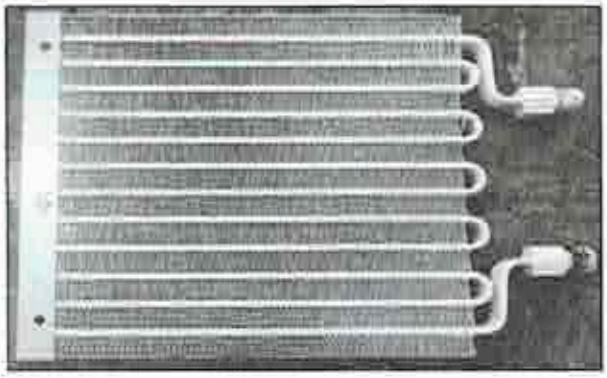
Condition			Cooling Capacity: 7KW			Rated Capacity: 6KW			Test NO: TR-NAR4AP-19-01-A	
			Rated Power: [illegible] W			Rated EER: [illegible] W/W			Pressure: 30	
Item		Unit	1	2	3	4	5	6	7	Average
Electrical Characteristic	Voltage	V	230.0	230.0	229.9	229.9	230.1	230.0	230.0	230.0
	Current	A	3.85	3.90	3.90	3.90	3.90	3.85	3.85	3.85
	Wattage	W	875.3	876.8	875.7	875.4	875.2	874.3	875.4	875.5
	Kilowatt measured	W	109.07	109.11	109.11	109.08	108.17	107.94	109.07	109.09
	Power Factor	%	98.83	98.94	98.83	98.83	98.83	98.82	98.84	98.84
	Frequency	Hz	59.99	59.98	59.99	59.99	60.00	59.99	59.99	59.99
System Pressures	Refrigerant Pressure(Suction)	MPa								
	Refrigerant Pressure(Discharge)	MPa								
System Temperatures	EVAP IN	°C	11.19	11.16	11.18	11.20	11.20	11.18	11.16	11.18
	EVAP OUT	°C	12.48	12.44	12.46	12.48	12.49	12.49	12.47	12.47
	AIR DISCHARGE	°C	14.89	14.88	14.92	14.90	14.94	14.92	14.91	14.91
	TC 04	°C								
	TC 05	°C								
	TC 06	°C								
	TC 07	°C								
	TC 08	°C								
	TC 09	°C								
	TC 10	°C								
	TC 11	°C								
	TC 12	°C								
	TC 13	°C								
	TC 14	°C								
	TC 15	°C								
	TC 16	°C								
	TC 17	°C								
	TC 18	°C								
	SUCTION	°C	12.35	12.32	12.35	12.35	12.35	12.36	12.37	12.35
	DISCHARGE	°C	89.77	89.60	89.79	89.85	89.84	89.67	89.90	89.80
	CONDENSER IN	°C	85.85	85.56	85.91	85.85	85.85	85.99	85.99	85.94
	CONDENSER OUT	°C	51.87	51.90	51.94	51.89	51.85	51.90	51.93	51.91
	O. AIR DISCHARGE	°C	53.39	53.47	53.50	53.45	53.53	53.50	53.47	53.47
	O. LOW SIDE	°C	12.09	12.09	12.05	12.11	12.06	12.15	12.09	12.09
	EC IN	°C	91.09	91.13	91.19	91.11	91.20	91.15	91.15	91.15
	EC OUT	°C	49.29	49.27	49.30	49.27	49.33	49.24	49.28	49.28
	AIR INTAKE OD	°C	48.88	49.03	48.96	48.91	50.03	48.92	48.94	48.93
	TC 28	°C								
	TC 29	°C								
	TC 30	°C								
	TC 31	°C								
	TC 32	°C								
	TC 33	°C								
	TC 34	°C								
	TC 35	°C								
	TC 36	°C								
Indoor	Air Entering Temp. D.B.	°C	27.01	20.99	27.01	27.00	27.00	27.00	26.99	27.00
	Air Entering Temp. W.B.	°C	19.00	18.98	19.00	19.00	19.00	19.00	19.00	19.00
	Enthalpy Air Entering	kJ/kg	54.271	54.220	54.264	54.256	54.250	54.251	54.251	54.256
	Air Leaving Temp. D.B (C.D.)	°C	15.07	15.08	15.07	15.08	15.08	15.05	15.05	15.06
	Air Leaving Temp. W.B (C.D.)	°C	14.54	14.53	14.52	14.53	14.54	14.53	14.53	14.53
	Enthalpy Air Leaving	kJ/kg	41.042	41.012	41.030	41.006	41.021	41.004	40.999	41.017
	Enthalpy Difference	kJ/kg	13.23	13.22	13.23	13.25	13.23	13.25	13.25	13.24
	Specific Density	kg/m3	1.204	1.204	1.204	1.204	1.204	1.204	1.204	1.204
	Static Pressure	Pa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Nozzle Diff. Pressure	Pa	492.47	493.37	492.88	492.29	494.34	494.95	493.51	493.44
	Barometric Pressure	kPa	100.49	100.50	100.51	100.51	100.51	100.50	100.50	100.50
Outdoor	Air Leaving Temp. D.B (C.D.)	°C	46.01	46.01	46.00	46.01	46.00	46.00	45.99	46.00
	Air Leaving Temp. W.B (C.D.)	°C	28.99	29.00	28.98	28.99	29.01	28.99	29.00	29.00
Test Data	Air Volume	m3/min	8.25	8.24	8.25	8.24	8.24	8.24	8.25	8.24
	Cooling Capacity	kJ/h	7819.89	7796.18	7803.08	7811.00	7796.36	7814.04	7814.21	7806.19
	Sensible Cooling Capacity	kJ/h	6954.0	6938.2	6937.4	6946.7	6936.3	6947.7	6944.4	6944.4
	Code Tester Heat Loss	kJ/h	238.90	238.19	235.51	239.55	238.42	236.67	238.44	238.40
	Latent Heat Capacity	kJ/h	1097.9	1099.0	1092.9	1103.9	1094.4	1108.9	1107.8	1099.8
	Total Cooling Capacity	kJ/h	8049.4	8034.4	8039.6	8050.2	8033.7	8052.7	8052.6	8044.7
	Recooling Capacity Heat Rdt	%	93.80	93.69	93.76	93.66	93.68	93.88	93.86	93.80
	E.E.R.	kJ/h-W	9.196	9.172	9.181	9.198	9.169	9.211	9.199	9.189
	Net Eff. Heat Rdt	%	77.28	77.36	77.35	77.29	77.33	77.40	77.40	77.34
	Moisture Removal Capacity	Liter/h	0.45	0.45	0.44	0.45	0.44	0.45	0.45	0.45
Input Data	Refrigerant condenser in temp.			Blower Fan Motor Speed (1~10rpm)			Capillary Pressure Drop (+) or Rise (-)			
	Control Fan Motor speed rpm			Blower Fan Motor Speed (1~10rpm)			Capillary Pressure Drop (+) or Rise (-)			

2019-12-11	Fernando Gerona, Test Engineer	Reiner A. Arnilla, Senior Test Engineer	Jeremy A. Dimla, Laboratory Manager	WITH SUPER CONDENSER RB366
Test Date	Tested By:	Checked / Witnessed By:	Approved By:	Remarks:

ETV PHILIPPINES

UNIT UNDER TEST





Super Condenser

Outdoor

UNIT UNDER TEST REFRIGERANT/RATING PLATE

Refrigerant used

Rating Plate