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EMC COMPLIANCE REPORT
In accordance with:
EN 61000-6-2: 2005

Seeley International Pty Ltd

ENV

Fixed Evaporative Air Cooler

REPORT: E1402-0421-2
DATE: February, 2014

Accreditation Number: 18553
Accredited for compliance with ISO/IEC 17025

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Compliance Certificate

EMC Bayswater Test Report: E1402-0421-2
Issue Date: February, 2014

Test Sample(s):	Fixed Evaporative Air Cooler
Model No:	ENV
Serial No:	ENV13330001
Product No(s):	086903 (Breezair branded, European Market) 086927 (Braemar branded, Australia Market)
Client Details:	Mr Craig Simkin Seeley International Pty Ltd 112 O'Sullivan Road Lonsdale, South Australia, 5160 Australia Phone No: +61 8 8328 3850 e-mail: csimkin@seeleyinternational.com Fax No: +61 8 8328 3951
Test Specification(s):	EN 61000-6-2: 2005 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments.

Results Summary:

Power Frequency Magnetic Field	(EN 61000-4-8)	***Not Applicable****
Radio Frequency Electromagnetic Field	(EN 61000-4-3)	***Complied***
Electrostatic Discharge (ESD)	(EN 61000-4-2)	***Complied***
Radio Frequency Common Mode	(EN 61000-4-6)	***Complied***
Fast Transients	(EN 61000-4-4)	***Complied***
Surges	(EN 61000-4-5)	***Complied***
Voltage Dips and Interruptions	(EN 61000-4-11)	***Complied***

***Applicable only to apparatus containing devices susceptible to magnetic fields.*

Test Date(s): 20th January, 5th, 6th, 7th, & 10th February 2014

Test House (Issued By)

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The modified Seeley International Pty Ltd, ENV, Fixed Evaporative Air Cooler, complied with the applicable requirements of EN 61000-6-2: 2005.

Prepared by:

Neville Liyanapatabendige (EMC Test Engineer)	Fabio D'Amico (EMC Test Officer)	Approved by: Andrew Whiteford (General Manager)	20 February 2014 10:12 Date

EMC Compliance Report
for
Seeley International Pty Ltd

Contents

1. Introduction

Electromagnetic Compatibility (EMC) tests were performed on a Seeley International Pty Ltd, ENV, Fixed Evaporative Air Cooler**,** in accordance with the applicable requirements of EN 61000-6-2: 2005.

2. Summary of Results

Test	Result
Radio Frequency Electromagnetic Field	Complied, Criterion A
Electrostatic Discharge (ESD)	Complied, Criterion A
Radio Frequency Common Mode – Signal Ports	Complied, Criterion A
Radio Frequency Common Mode – Input AC Power Ports	Complied, Criterion A
Fast Transients – Signal Ports	Complied, Criterion B
Fast Transients – Input AC Power Ports	Complied, Criterion A
Surges – Signal Ports	Complied, Criterion A
Surges – Input AC Power Ports	Complied, Criterion A
Voltage Dips	Complied, Criterion A
Voltage Interruptions	Complied, Criterion C

Table 1: Summary of test results

3. Product Sample, Configuration & Modifications

3.1. Product Sample Details

The EUT (Equipment Under Test), as supplied by the client, is described as follows:

Product: Fixed Evaporative Air Cooler
Model No: ENV
Serial No: ENV13330001
Product No: 086903

Specifications: 380-415VAC, 50Hz (3 phase with neutral), 6.5A per phase

The EUT is a large commercial/industrial evaporative cooler, used to provide ventilation and cooling to offices, workshops and warehouses.

The highest internal frequency of the device is 8MHz.

(Refer to Photographs in Appendix B for views of the EUT)

3.2. EUT Configuration

The EUT was supplied with 415VAC, 50Hz (3 phase with neutral). A wall controller and a BMS controller were connected to the EUT. The Customer supplied and configured the EUT to operate in ventilation mode (fan only operation, operation of water circulation and drain pumps did not occur) and fan speed was set to mid level.

The EUT was placed on a 105cm height metallic support with 100mm radius rubber wheels (customer supplied the EUT with metallic frame support).

3.3. Modifications

Modifications were made by the customer to the EUT to comply with Radiated Disturbance and Mains Terminal disturbance testing (refer to E1401-0421-1 emission test report for detailed information).

3.4. Monitoring

Wall controller display was monitored visually in person or via a CCTV camera system and by listening to the operation of fan motors (operating noise) during testing. Correct EUT functionality was verified after each test.

4. Test Facility & Equipment

4.1. Test Facility

Tests were performed inside an anechoic chamber or a standard shielded enclosure, where applicable, at EMC Bayswater Pty Ltd, located at 18/88 Merrindale Drive, Croydon South, Victoria, 3136, Australia.

Fast transients, Surges, Voltage dips and interruptions were performed inside the indoor Open Area Test Site (iOATS) facility at EMC Technologies Pty Ltd, located at 176 Harrick Road, Keilor Park, Victoria, 3042, Australia.

4.2. Test Equipment

Refer to Appendix A for the measurement instrument list.

5. Referenced Standards

EN 61000-6-2: 2005
Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments.

EN 61000-4-2: 1996
Electromagnetic Compatibility – Part 4. Testing and measurement techniques. Section 2. Electrostatic discharge immunity test.

EN 61000-4-3: 2006
Electromagnetic Compatibility – Part 4. Testing and measurement techniques. Section 3. Radiated, radio frequency, electromagnetic field immunity test.

EN 61000-4-4: 2004
Electromagnetic Compatibility – Part 4. Testing and measurement techniques. Section 4. Electrical Fast Transient/burst immunity test.

EN 61000-4-5: 2006
Electromagnetic Compatibility – Part 4. Testing and measurement techniques. Section 5. Surge Immunity test.

EN 61000-4-6: 2007
Electromagnetic Compatibility – Part 4. Testing and measurement techniques. Section 6. Immunity to conducted disturbances, induced by radio-frequency fields.

EN 61000-4-8: 2001
Electromagnetic Compatibility – Part 4. Testing and measurement techniques. Section 8. Power frequency magnetic field immunity test.

EN 61000-4-11: 2004
Electromagnetic compatibility (EMC) - Testing and measurement techniques – Part 4. Voltage dips, short interruptions and voltage variations immunity tests

6. Performance (Pass/Fail) Criteria

The performance of the EUT was subject to the following performance criteria as specified in the referenced Standard:

Performance criterion A: The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

In addition to the above, *the EUT shall not become dangerous or unsafe as a result of the application of the tests defined in this Standard.*

7. Radio-Frequency Electromagnetic Field (EN 61000-4-3)

7.1. Requirements

The EUT must comply with performance criterion A.

7.2. Test Procedure

Prior to testing, a sixteen point 10V/m (80-1000MHz), 3V/m (1.4-2.7GHz), CW electric field was calibrated at a distance of 2.2 metres (80-1000MHz) and a distance of 3.0 metres (1.4-2.7GHz) from the transmitting antenna using an orthogonal electric field probe. The forward power to the antenna, required to achieve the desired electric field strength, was recorded using immunity software and stored as a look up table. The frequency ranges of 80MHz to 1000MHz, 1.4-2.0GHz and 2.0-2.7GHz were swept incrementally using 1% step sizes, whilst a levelled RF field was maintained.

The orthogonal electric field probe was replaced by the EUT. The drive level of the amplifier was adjusted accordingly to achieve the forward power level recorded in the electric field lookup table at each frequency interval.

The EUT was positioned 1.05m above the reference ground plane. All wiring to the EUT was left exposed to the electromagnetic field for a distance of 1m. All wiring less than or equal to 3m was bundled low-inductively to a 1m length. All wiring greater than 3m had RF ferrite beads placed 1m along the wiring.

The frequency ranges of 80MHz to 1000MHz, 1.4-2.0GHz and 2.0-2.7GHz were swept incrementally using 1% step sizes, with modulation (80% AM @ 1kHz) with a dwell time of 3 seconds per frequency step.

Both horizontal and vertical antenna polarizations were used to radiate front and right side (to ensure both side of distribution panel PCB were exposed to field) of the EUT, in turn.

(Refer to photographs 27 to 30 in Appendix B for views of the test configurations)

7.3. Test Results

Field Level (V/m)	Antenna Polarisation	Frequency (MHz)	Observation	Results
10	Vertical	80-1000	No fault or loss of function	Complied, Criterion A
3		1400-2000	No fault or loss of function	Complied, Criterion A
3		2000-2700	No fault or loss of function	Complied, Criterion A
10	Horizontal	80-1000	No fault or loss of function	Complied, Criterion A
3		1400-2000	No fault or loss of function	Complied, Criterion A
3		2000-2700	No fault or loss of function	Complied, Criterion A

Table 2: Radio-Frequency Electromagnetic Field (Amplitude Modulated)

Climatic Conditions	
Temperature:	26°C - 31°C
Humidity:	29% - 34%

Table 3: Climatic conditions

Comments: No fault or loss of function was observed.

In the frequency range of 2GHz to 2.7GHz an electric field of 3V/m CW was calibrated instead of 1V/m as required in the standard. This was done to ensure that 1V/m was achieved. The EUT was effectively over tested in this range.

Assessment: The EUT complied with the Radio-Frequency Electromagnetic Field immunity requirements of EN 61000-6-2: 2005, performance criterion A.

8. Electrostatic Discharge (EN 61000-4-2)

8.1. Requirements

The EUT must comply with performance criterion B.

8.2. Test Procedure

A Horizontal Coupling Plane (HCP), 1.6m x 0.8m was placed on top of a wooden table 0.8m high, standing on the ground reference plane. The EUT (Wall Controller) and cables were isolated from the coupling plane by an insulating film 0.5mm thick.

The cooler was placed on a metallic support, 1.05m above the ground reference plane.

- Both contact and air discharge were applied (as applicable) to:
  - all faces and access points of the EUT
  - the Vertical Coupling Plane (VCP)
  - the Horizontal Coupling Plane (HCP)
- All coupling planes were connected to the ground reference plane via a strap with a 470kΩ resistor located at each end.
- Contact discharges were applied to all conductive surfaces and to the coupling planes. Air discharges were applied only to the insulating surfaces.
- Discharges applied to the HCP and VCP were applied on each side of the EUT. Discharges made to the HCP were applied 0.1m from the EUT. Discharges made to the VCP were applied to the centre of one vertical edge of the coupling plane. The VCP (0.5m x 0.5m), was placed parallel to and positioned 0.1m from the EUT.
- The test voltage was increased from the minimum to the selected test level, in order to determine any threshold of failure.
- The test voltage was increased from the minimum (contact: ±2kV, air: ±2kV) to the selected test level (contact: ±4kV, air: ±8kV), in order to determine any threshold of failure.
- At least 10 single discharges were applied in both positive and negative polarities at ±4.0kV for HCP, VCP and contact discharge and at ±8.0kV for air discharges.

(Refer to photographs 31 to 35 in Appendix B for views of the test configurations)

8.3. Discharge Points

Indirect contact discharges were applied to the Horizontal Coupling Plane (HCP) at the following positions:

- Front & Rear of EUT (Wall Controller only)
- Right and Left hand sides of EUT (Wall Controller only)

Indirect contact discharges were applied to the Vertical Coupling Plane (VCP) with the EUT at the following positions:

- Front & Rear of EUT
- Right and left hand sides of EUT

Direct contact discharges were applied to the following points (Test points 1 to 15):

- All over the EUT (conductive surfaces, screws and connectors)

Direct air discharges were applied to the following points (Test points A to D):

- Insulated surfaces, connectors and connector casings
- Insulated push buttons
- Insulated Display

(Refer to photographs 36 to 39 in Appendix B for views of the test points)

8.4. Test Results

Indirect Application

Application	ESD Voltage	Observation	Results
HCP	±2.0 kV	No fault or loss of function detected	Complied, Criterion A
	±4.0 kV		
VCP	±2.0 kV	No fault or loss of function detected	Complied, Criterion A
	±4.0 kV		

Table 4: Electrostatic Discharges – Indirect Application

Direct Application – Contact Discharge

Application	ESD Voltage	Observation	Results
1 to 15	±2.0 kV	No fault or loss of function detected	Complied, Criterion A
	±4.0 kV		

Table 5: Electrostatic Discharges – Contact discharge

Direct Application – Air Discharge

Application	ESD Voltage	Observation	Results
A to D	±4.0 kV	No fault or loss of function detected	Complied, Criterion A
	±8.0 kV		

Table 6: Electrostatic Discharges – Air discharge

Climatic Conditions	
Temperature:	26-29°C
Humidity:	32-33%

Table 7: Climatic conditions

Comments: No fault or loss of function was observed.

Assessment: The EUT complied with the ESD requirements of EN 61000-6-2: 2005, performance criterion A.

9. Radio-Frequency Common Mode (EN 61000-4-6)

9.1. Requirements

The EUT must comply with performance criterion A.

9.2. Test Procedure

The EUT was placed on a metallic support, 1.05m above the ground reference plane. All coupling and decoupling devices were placed in direct contact with the elevated ground reference plane and at a distance of 0.3m away from the EUT. Cables running to the EUT were kept as short as possible and were not bundled or wrapped. The cables were kept between 30 mm to 50 mm above the ground reference plane.

A signal generator was used to provide a drive signal to an RF power amplifier, which in turn provided the drive level to the coupling device.

A Bulk Current Injection (BCI) probe was used to apply the RF signal to AC mains and signal/control cables, in turn.

A 10Vrms pre-calibrated (CW calibration using a 50Ω system) RF signal was applied to the coupling device with modulation (AM, 80%, 1kHz) over the frequency range of 0.150 MHz to 80 MHz.

The frequency was incremented using 1% step sizes with a dwell time of 3 seconds.

(Refer to photographs 40 to 42 in Appendix B for views of the test configurations)

9.3. Test Results

AC Power Port

Port	Test Level (V_{RMS})	Frequency (MHz)	Observation	Result
3 phase AC Power	10	0.15-80.0	No fault or loss of function	Complied, Criterion A

Table 8: Radio-Frequency Common Mode – AC Power Port (BCI Application)

Signal Ports

Port	Test Level (V_{RMS})	Frequency (MHz)	Observation	Result
Wall control cable – Wall controller side	10	0.15-80.0	No fault or loss of function	Complied, Criterion A
Wall control cable – Cooler side	10	0.15-80.0	No fault or loss of function	Complied, Criterion A
BMS Control Cable – BMS controller side	10	0.15-80.0	No fault or loss of function	Complied, Criterion A
BMS Control Cable – Cooler side	10	0.15-80.0	No fault or loss of function	Complied, Criterion A

Table 9: Radio-Frequency Common Mode – Signal Ports (BCI Application)

Climatic Conditions	
Temperature:	34°C
Humidity:	26%

Table 10: Climatic conditions

Comments: No fault or loss of function was observed.

BCI probe was used to apply RF signals to the AC mains port instead of CDN due to test equipment limitation.

Assessment: The EUT complied with the Radio-Frequency Common Mode requirements of EN 61000-6-2: 2005, performance criterion A.

10. Fast Transients (EN 61000-4-4)

10.1. Requirements

The EUT must comply with performance criterion B.

10.2. Test Procedure

In a shielded chamber, the EUT was placed on the ground reference plane separated by a 1.05m high metallic support. The EUT was connected and powered via the 3 phase CDN.

For application to the signal ports, a capacitive coupling clamp was placed on the ground reference plane (chamber floor). The transient generator was connected to the end of the clamp nearest to the EUT. The cable of the signal port under test was placed in the capacitive coupling clamp.

Transient bursts at the specified severity level were applied to the AC port and the signal ports.

The test voltage was stepped from ±1kV up to the test level on the AC power port (±1.0kV, ±2.0kV) and signal ports (±0.5kV, ±1.0kV).

The transient generator settings were as follows:

Test Voltage:	±2.0kV (AC power port), ±1.0kV (Signal ports)
Rise time (Tr):	5ns
Pulse width (Th):	50ns
Repetition rate:	5kHz
Burst duration:	15ms
Burst period:	300ms
Test time:	60sec per test

(Refer to photographs 43 to 45 in Appendix B for views of the test configurations)

10.3. Test Results

AC Power Port

AC Port (Mains)	Test Voltage	Observation	Results
L1 + L2 + L3+N+E	±1.0kV	No fault or loss of function detected	Complied, Criterion A
L1 + L2 + L3+N+E	±2.0kV	No fault or loss of function detected	Complied, Criterion A

Table 11: Fast Transients – AC Power Port

Signal Ports

Port	Test Voltage	Observation	Results
Wall control cable – Wall controller side	±0.5kV	No fault or loss of function detected	Complied, Criterion A
	±1.0kV	No fault or loss of function detected	
Wall control cable – Cooler side	±0.5kV	No fault or loss of function detected	Complied, Criterion A
	±1.0kV	No fault or loss of function detected	
BMS Control Cable – BMS controller side	±0.5kV	*See comments below	Complied, Criterion B
	±1.0kV	*See comments below	
BMS Control Cable – Cooler side	±0.5kV	*See comments below	Complied, Criterion B
	±1.0kV	*See comments below	

Table 12: Fast Transients – Signal Ports

Climatic Conditions	
Temperature:	26°C
Humidity:	45%

Table 13: Climatic conditions

Comments: *BMS controller Red LED blinked with low brightness during testing and auto recovered after the application (probably LED was effected by fast transient application). No changes to fan motor speeds or errors on wall controller were observed. The BMS controller fan speed control operated normally during and after the application.

Assessment: The EUT complied with the Fast Transients requirements of EN 61000-6-2: 2005, performance criterion B.

11. Surges (EN 61000-4-5)

11.1. Requirements

The EUT must comply with performance criterion B.

11.2. Test Procedure

For testing on the AC ports, the EUT was placed on a wooden support 0.1m high, above the metal ground plane. The EUT was connected to, and powered by, the surge generator. The length of the power cable between the coupling devices and the EUT was less than 1m. In the case of a non-detachable supply cable more than 1m long, the excess length of this cable was gathered into a flat coil with a 0.4m diameter.

Surges at the specified severity level were applied to the AC Input power ports:

(a) Phase - to – Neutral (Line to Line)
(b) Phase – to – Phase (Line to Line)
(c) Phase - to – Earth (Line to Earth)
(d) Neutral - to – Earth (Line to Earth)

For the signal ports, the EUT was placed on a 0.1m high insulating support on the ground plane. For unshielded cables, surges were applied to the signal port via a 0.5µF, 20mH coupling network at a distance of 2m from the EUT.

The surge generator settings were as follows:

Test Voltage:	±2.0kV (line to earth) and ±1.0kV (line to line and signal ports).
Rise time (Tr):	1.2µs
Pulse width (Th):	50µs
No of pulses:	10 of each polarity per test
Repetition rate:	4 per minute

(Refer to photographs 46 & 47 in Appendix B for views of the test configurations)

11.3.Test Results

AC Power Port

AC Port (Mains)	Test Voltage	Observation	Results
L1-to-Earth (Line to Earth)	±0.5 kV	No fault or loss of function detected	Complied, Criterion A
L2-to-Earth (Line to Earth)	±0.5 kV	No fault or loss of function detected	Complied, Criterion A
L3-to-Earth (Line to Earth)	±0.5 kV	No fault or loss of function detected	Complied, Criterion A
N-to-Earth (Line to Earth)	±0.5 kV	No fault or loss of function detected	Complied, Criterion A
L1-to-L2 (Line to Line)	±0.5 kV	No fault or loss of function detected	Complied, Criterion A
L1-to-L3 (Line to Line)	±0.5 kV	No fault or loss of function detected	Complied, Criterion A
L2-to-L3 (Line to Line)	±0.5 kV	No fault or loss of function detected	Complied, Criterion A
L1-to-N (Line to Line)	±0.5 kV	No fault or loss of function detected	Complied, Criterion A
L2-to-N (Line to Line)	±0.5 kV	No fault or loss of function detected	Complied, Criterion A
L3-to-N (Line to Line)	±0.5 kV	No fault or loss of function detected	Complied, Criterion A
L1-to-Earth (Line to Earth)	±1.0 kV	No fault or loss of function detected	Complied, Criterion A
L2-to-Earth (Line to Earth)	±1.0 kV	No fault or loss of function detected	Complied, Criterion A
L3-to-Earth (Line to Earth)	±1.0 kV	No fault or loss of function detected	Complied, Criterion A
N-to-Earth (Line to Earth)	±1.0 kV	No fault or loss of function detected	Complied, Criterion A
L1-to-L2 (Line to Line)	±1.0 kV	No fault or loss of function detected	Complied, Criterion A
L1-to-L3 (Line to Line)	±1.0 kV	No fault or loss of function detected	Complied, Criterion A
L2-to-L3 (Line to Line)	±1.0 kV	No fault or loss of function detected	Complied, Criterion A
L1-to-N (Line to Line)	±1.0 kV	No fault or loss of function detected	Complied, Criterion A
L2-to-N (Line to Line)	±1.0 kV	No fault or loss of function detected	Complied, Criterion A
L3-to-N (Line to Line)	±1.0 kV	No fault or loss of function detected	Complied, Criterion A
L1-to-Earth (Line to Earth)	±2.0 kV	No fault or loss of function detected	Complied, Criterion A
L2-to-Earth (Line to Earth)	±2.0 kV	No fault or loss of function detected	Complied, Criterion A
L3-to-Earth (Line to Earth)	±2.0 kV	No fault or loss of function detected	Complied, Criterion A
N-to-Earth (Line to Earth)	±2.0 kV	No fault or loss of function detected	Complied, Criterion A

Table 14: Surges – AC Power Port

Signal Ports

Port	Test Voltage	Observation	Results
Wall control cable – Wall controller side	±0.5kV	No fault or loss of function detected	Complied, Criterion A
	±1.0kV	No fault or loss of function detected	
Wall control cable – Cooler side	±0.5kV	No fault or loss of function detected	Complied, Criterion A
	±1.0kV	No fault or loss of function detected	
BMS Control Cable – BMS controller side	±0.5kV	No fault or loss of function detected	Complied, Criterion A
	±1.0kV	No fault or loss of function detected	
BMS Control Cable – Cooler side	±0.5kV	No fault or loss of function detected	Complied, Criterion A
	±1.0kV	No fault or loss of function detected	

Table 15: Surges – Signal Ports

Climatic Conditions	
Temperature:	26°C
Humidity:	45%

Table 16: Climatic conditions

Comments: No fault or loss of function was observed.

Assessment: The EUT complied with the Surges immunity requirements of EN 61000-6-2: 2005, performance criterion A.

12. Voltage Dips and Interruptions (EN 61000-4-11)

12.1. Requirements

The EUT must comply with performance criterion B for voltage dips of 0% residual voltage for 1 cycle. The EUT must comply with performance criterion C, for voltage dips of 40% residual voltage for 10 cycles, voltages dips of 70% residual voltage for 25 cycles and voltage interruptions of 0% residual voltage for 250 cycles.

12.2. Test Procedure

The EUT was placed on a wooden table 0.8m high, above the metal ground plane. The EUT was connected to, and powered by, the test generator. The length of the power cable between the coupling devices and the EUT was less than 1m. In the case of a non-detachable supply cable more than 1m long, the excess length of this cable was gathered into a flat coil with a 0.4m diameter.

Voltage dips of 0% residual voltage for 1 period (20ms), 40% residual voltage for 10 cycles (200ms) and 70% residual voltage for 25 cycles (500ms) were applied to the AC power port.

Voltage interruptions of 0% residual voltage for 250 cycles, (5000ms) were applied to the AC power port.

(Refer to photograph 48 in Appendix B for a view of the test configuration)

12.3. Test Results

Type	Test Specification	Observation	Results
Voltage Dip	0% Residual voltage, 1 cycle	No fault or loss of function detected	Complied, Criterion A
Voltage Dip	40% Residual voltage, 10 cycles	No fault or loss of function detected	Complied, Criterion A
Voltage Dip	70% Residual voltage, 25 cycles	No fault or loss of function detected	Complied, Criterion A
Voltage Interruption	0% Residual voltage, 250 cycles	Manual restart required	Complied, Criterion C

Table 17: Voltage Dips and Interruptions

Climatic Conditions	
Temperature:	36°C
Humidity:	28%

Table 18: Climatic conditions

Comments: The EUT turned off during the voltage interruption application and required manual restart. After the interruption performance returned to normal, thus complying with performance criterion C.

Voltage dips were applied on phase to neutral (one at a time) only.

Voltage interruptions were applied to all three phases simultaneously.

Phase to phase voltage dips were not applied due to test equipment limitation.

Assessment: The EUT complied with the Voltage Dips requirements of EN 61000-6-2: 2005, performance criterion A and the Voltage Interruptions requirements of EN 61000-6-2: 2005, performance criterion C.

13. Conclusion

The modified Seeley International Pty Ltd, ENV, Fixed Evaporative Air Cooler complied with the applicable requirements of EN 61000-6-2: 2005.

Appendix A – Test Equipment

Inv	Equipment	Make	Model No.	Serial No.	Calibration	
					Due	Type
Electrostatic Discharge						
730	ESD Generator System	EMC Partner	ESD3000	150	Jul 14	E
666	Enclosure, Semi-Anechoic, No 1	RFI Ind	S800 iOATS	1229	Dec 14	I
Fast Transients & Surges						
G022	Transient Generator	Thermo Electron Corp (KeyTek)	EMCPRO	9710215	Apr 14	E
472	Network, CDN, 3 phase	EMC Partner	TRA1Z45B	CDN1000-29	N/A	V
C115	Capacitive Coupling Clamp	Shaffner	CDN126	-	N/A	V
Room12*	Indoor OATS (iOATS)	Frankonia	-	-	Dec 14	V
Voltage Dips and Interruptions						
471	Transient Generator	EMC Partner	TRA1H01B	TRA1000-215	N/A	V
472	Network, CDN, 3 phase	EMC Partner	TRA1Z45B	CDN1000-29	N/A	V
474	Variac, 16A, external	EMC Partner	TRA1Z17B-HW	VAREXT1000-14	N/A	V
Radio-Frequency Electromagnetic Field (80-1000MHz)						
467	1-1000MHz RF Amplifier	Amplifier Research	100W1000	20724	N/A	V
26	10kHz-220MHz RF Amplifier	Amplifier Research	250L	9460	N/A	V
1016	Signal Generator	Agilent	N9310A	CN01153847	Jan 15	I
560	Mainframe Field Monitor	Amplifier Research	FM 5004	21422	N/A	V
310	METER, Field Strength (& PROBE, E-field, Iso)	Holaday	HI-4416	8970966	Mar 14	E
269	ANTENNA, Biconilog	EMCO	3143	1026	N/A	V
1042	CABLE, Coax, RG-213	Rojone	N/A	N/A	Jan 15	I
1041	CABLE, Coax, RG-213	Rojone	N/A	N/A	Jan 15	I
982	CABLE, Coax	Generic	RG-213	312	Jan 15	I
738	Bi-Directional Coupler	Werlatone	C6277-10	20129	Oct 15	I
740	Power Sensor	Agilent	E9304A	MY41496556	Dec 14	E
741	Power Sensor	Agilent	E9304A	MY41496517	Dec 14	E
737	Power Meter	Agilent	E4419B	MY45100325	Dec 14	E
666	Enclosure, Semi-Anechoic, No 1	RFI Ind	S800 iOATS	1229	Dec 14	I

V: Verification of operation against an internal reference
I: Internal calibration against a NATA traceable standard
E: External calibration by a NATA endorsed facility
N/A: Not Applicable

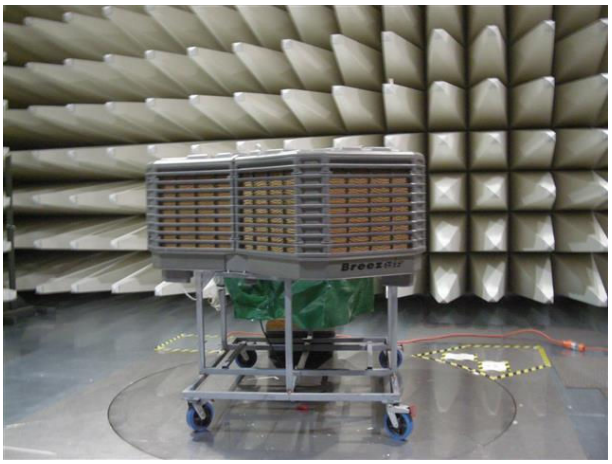
Inv	Equipment	Make	Model No.	Serial No.	Calibration	
					Due	Type
Radio-Frequency Electromagnetic Field (1.4-2.7GHz)						
737	Power Meter	Agilent	E4419B	MY45100325	Dec 14	E
740	Power Sensor	Agilent	E9304A	MY41496556	Dec 14	E
1127	Amplifier, RF, power	IFI	S31-100	R1705 1213	N/A	V
209	ANTENNA, Double Ridge Horn	EMCO	3115	9210-3945	Aug 15	I
1016	Signal Generator	Agilent	N9310A	CN01153847	Jan 15	I
501	E-Field Probe	Holaday	HI-4450	96627	Aug 14	E
560	Mainframe Field Monitor	Amplifier Research	FM 5004	21422	N/A	V
666	Enclosure, Semi-Anechoic, No 1	RFI Ind	S800 iOATS	1229	Dec 14	I
600	COUPLER, Coax, Bi-directional	Narda	3022	10096	May 14	I
942	ATTENUATOR, 20dB	JFW	50FPE-020	N/A	Aug 14	I
943	ATTENUATOR, 20dB	JFW	50FPE-020	N/A	Aug 14	I
989	CABLE, Coax, Sucoflex 104A	Huber+Suhner	44454/4A	44454/4A	Jan 15	I
1039	CABLE, Coax, RG-214	Huber+Suhner	N/A	N/A	Jan 15	I
1040	CABLE, Coax, RG-213	RFI	N/A	N/A	Jan 15	I
Radio-Frequency Common Mode						
636	GENERATOR, Signal, RF	Gigatronics (Fluke)	6080A	5465602	Jan 15	I
583	Amplifier, RF, power	ENI	3200L	127	N/A	V
737	Power Meter, Dual	Agilent	E4419B	MY45100325	Dec 14	E
214	Bi-Directional Coupler	Amplifier Research	DC2000	12090	May 14	I
740	Power Sensor	Agilent	E9304A	MY41496556	Dec 14	E
994	CABLE, Coax	Huber+Suhner	RG-214/U	C004	Jan 15	I
993	CABLE, Coax, 1m	Belden	RG-213	C016	Jan 15	I
992	CABLE, Coax, 1m	Belden	RG-213	C001	Jan 15	I
656	Bulk Current Injection Probe	FCC	F-120-3	101	N/A	V
65	Probe, Current, RF	Solar	6741-1	8020-21	Oct 16	I
981	CABLE, Coax, 1m	Huber+Suhner	HSA95465/2800	0082	Jan 14	I
945	Attenuator 6dB	JFW	50FH-006-300	0703	Jan 16	I
667	Shielded Enclosure #1	RFI Industries	S800	1201	N/A	V
General Equipment						
997	HYGROMETER, Temp, Humidity	RS	408	6109	Mar 14	E

V: Verification of operation against an internal reference
I: Internal calibration against a NATA traceable standard
E: External calibration by a NATA endorsed facility
N/A: Not Applicable

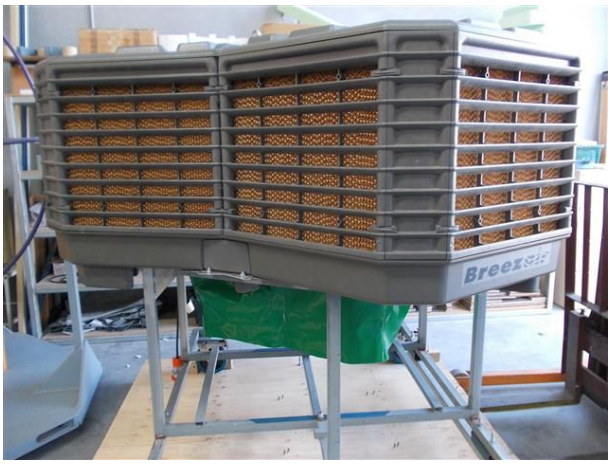
Appendix B – Photographs

Number	Photograph Description
1	EUT – ENV Cooler – External views
2	
3	
4	
5	EUT – Wall controller – External views
6	
7	
8	EUT – BMS controller – External views
9	
10	EUT – ENV Cooler – Internal views
11	
12	
13	
14	
15	
16	
17	EUT – Wall controller – Internal views
18	
19	EUT – BMS controller – Internal views
20	
21	EUT – ENV Cooler – Identification labels
22	
23	EUT – ENV Cooler – Fan motors (3 motors) - Identification labels
24	
25	
26	EUT – Wall controller – Identification label
27	Radio-frequency Electromagnetic Field – Test configuration – EUT front
28	Radio-frequency Electromagnetic Field – Test configuration – EUT right side
29	Radio-frequency Electromagnetic Field – Test configuration – Below 1GHz
30	Radio-frequency Electromagnetic Field – Test configuration – Above 1GHz
31	ESD – Test configuration – Indirect application – HCP
32	ESD – Test configuration – Indirect application – VCP
33	
34	ESD – Test configuration – Direct application – Contact discharge
35	ESD – Test configuration – Direct application – Air discharge
36	ESD –Direct application – Contact discharge – Test points
37	ESD – Direct application – Air discharge – Test points
38	
39	

Number	Photograph Description
40	Radio-frequency Common Mode – Test configuration – AC power ports
41	Radio-frequency Common Mode – Test configuration – Signal ports
42	
43	Fast Transients – Test configuration – AC power ports
44	Fast Transients – Test configuration – Signal ports
45	
46	Surges – Test configuration – AC power ports
47	Surges – Test configuration – Signal ports
48	Voltage Dips and Interruptions - Test configuration



Photograph 1



Photograph 2

Photograph 3

Photograph 4

Photograph 5

Photograph 6

Photograph 7

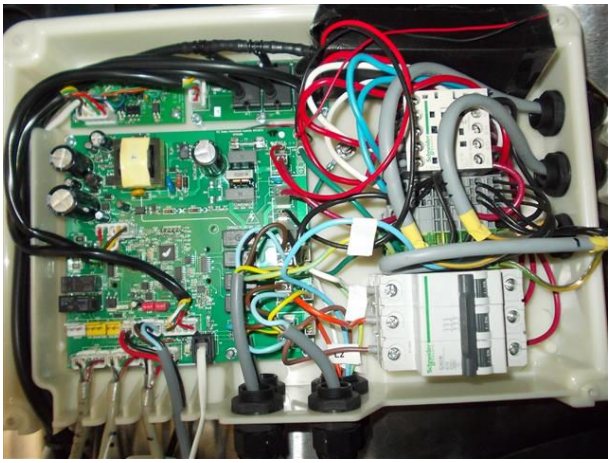
Photograph 8

Photograph 9

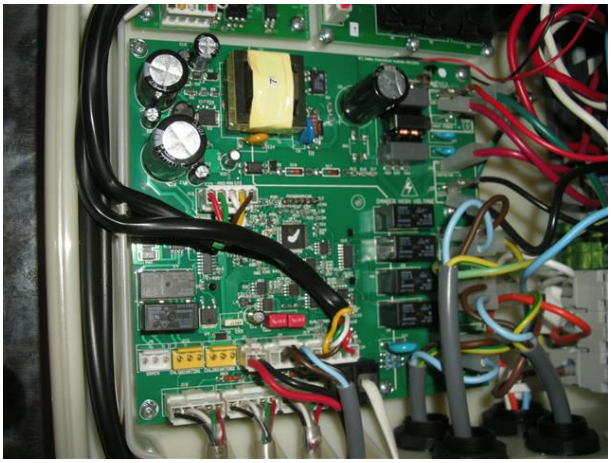
Photograph 10

Photograph 11

Photograph 12

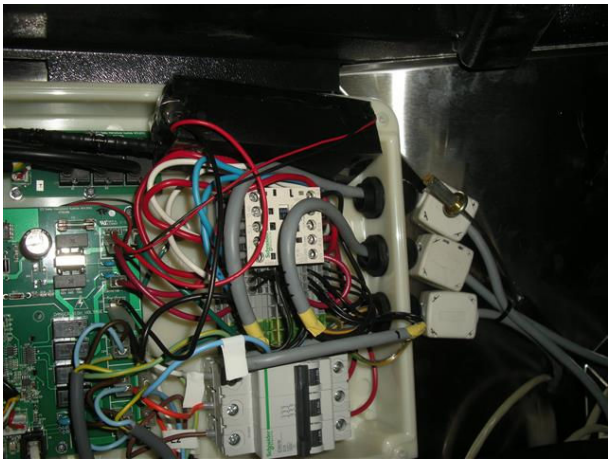


Photograph 13



Photograph 14

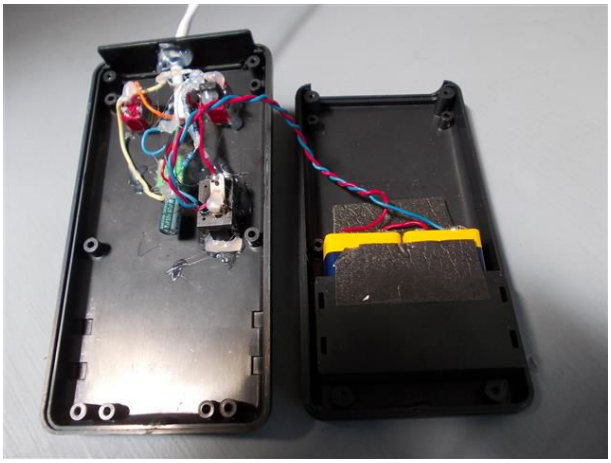
Photograph 15



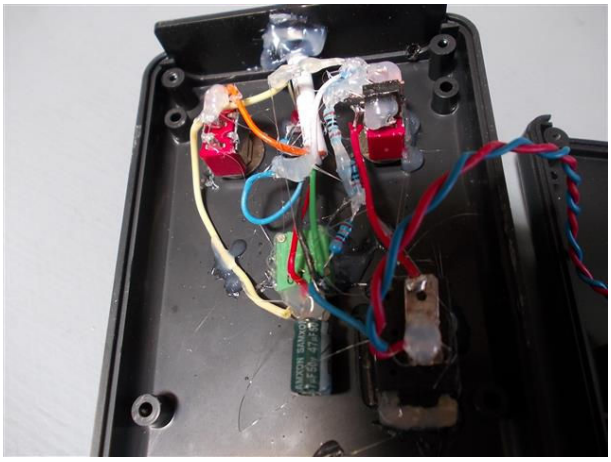
Photograph 16

Photograph 17

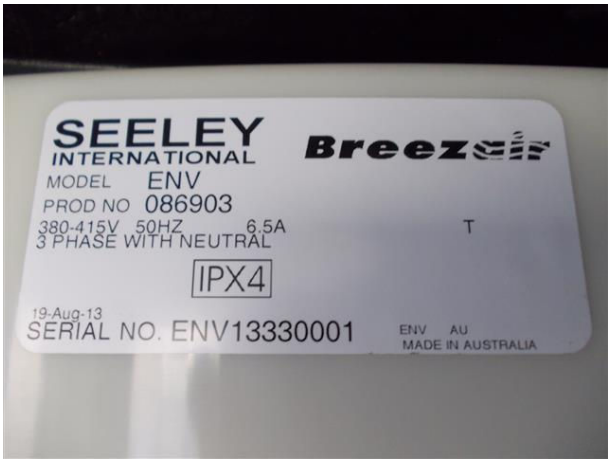
Photograph 18



Photograph 19

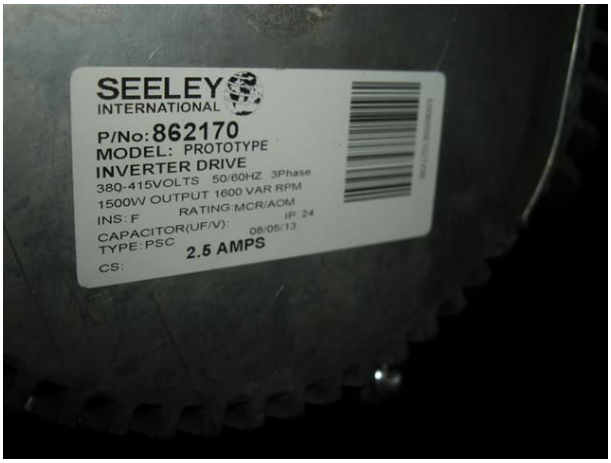


Photograph 20

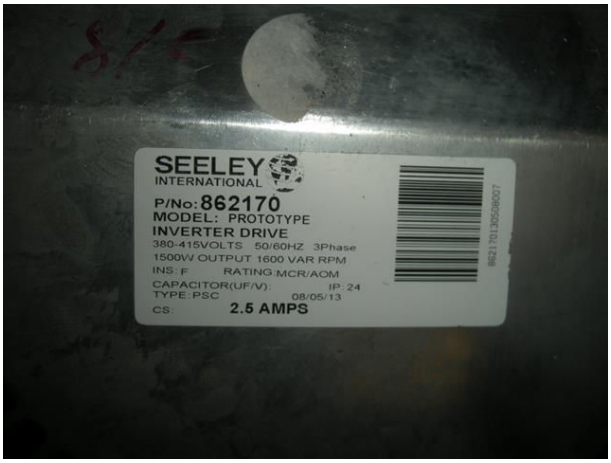


Photograph 21

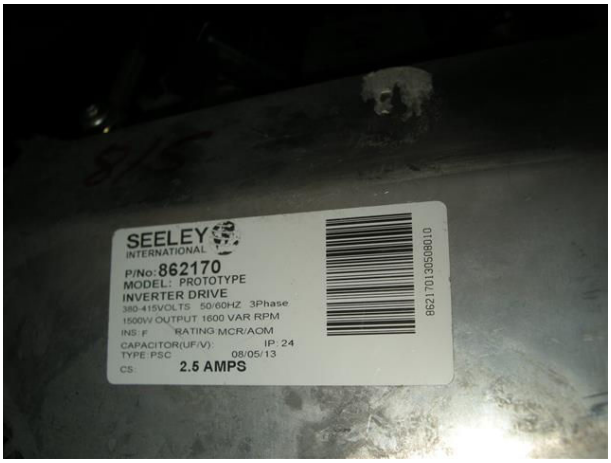
Photograph 22



Photograph 23

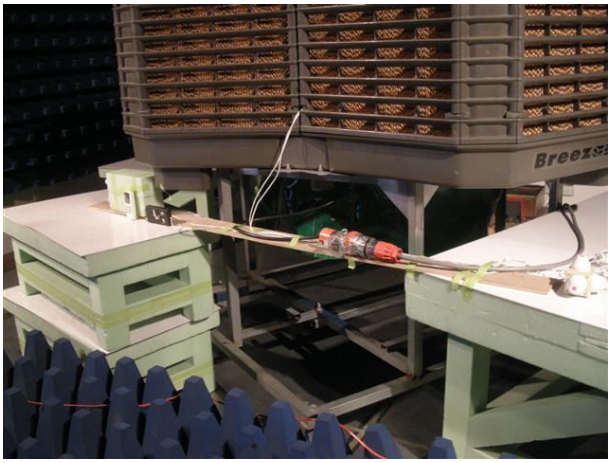


Photograph 24

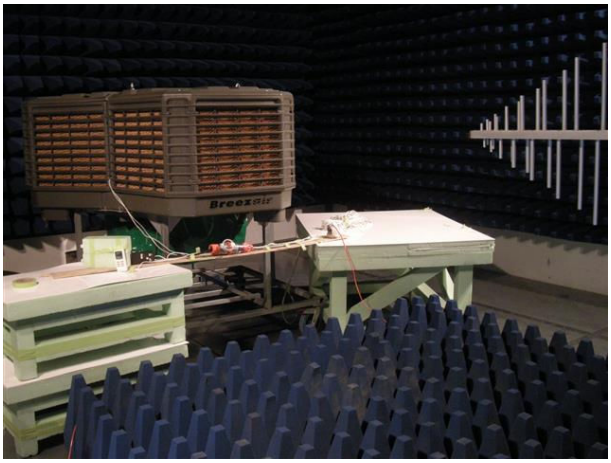


Photograph 25

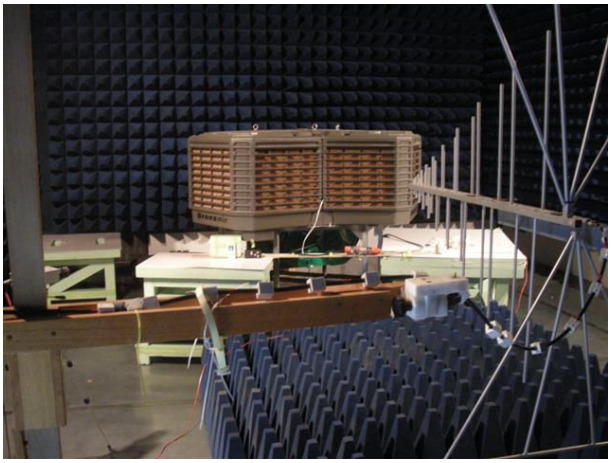
Photograph 26



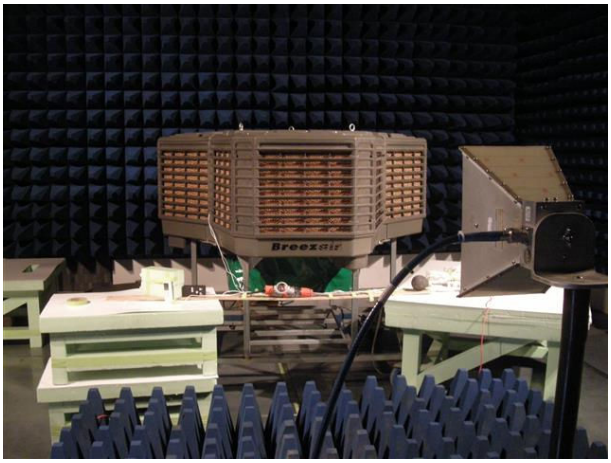
Photograph 27



Photograph 28



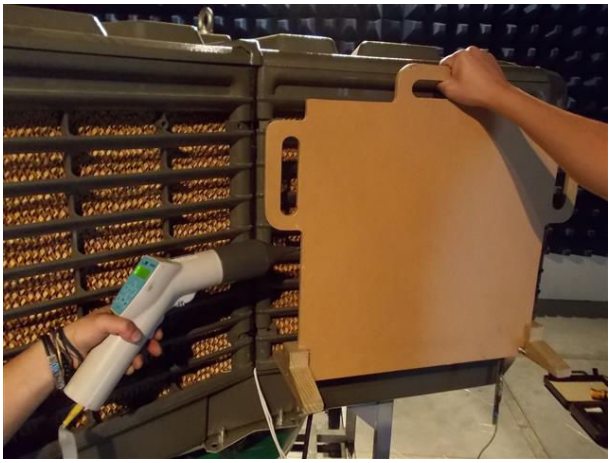
Photograph 29



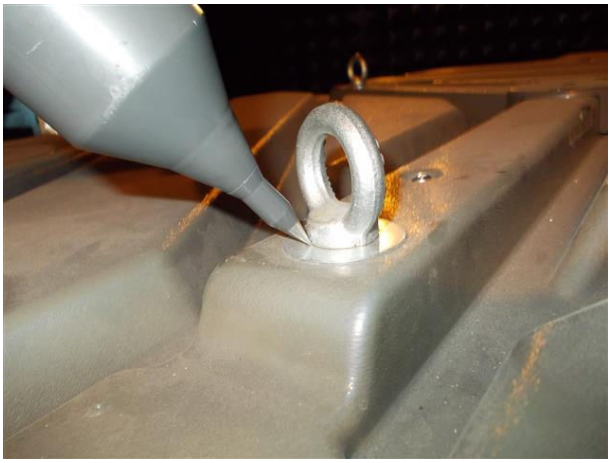
Photograph 30

Photograph 31

Photograph 32

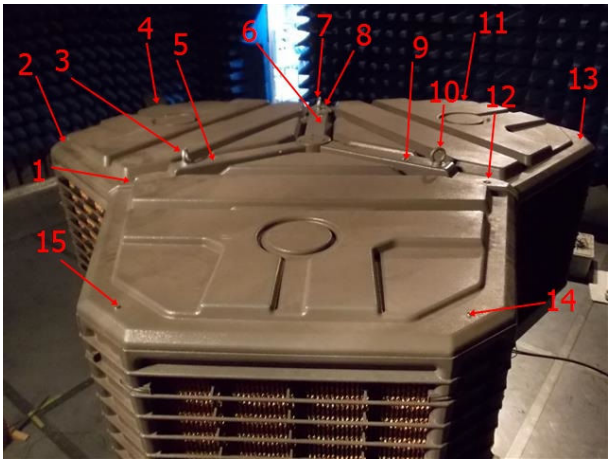


Photograph 33



Photograph 34

Photograph 35



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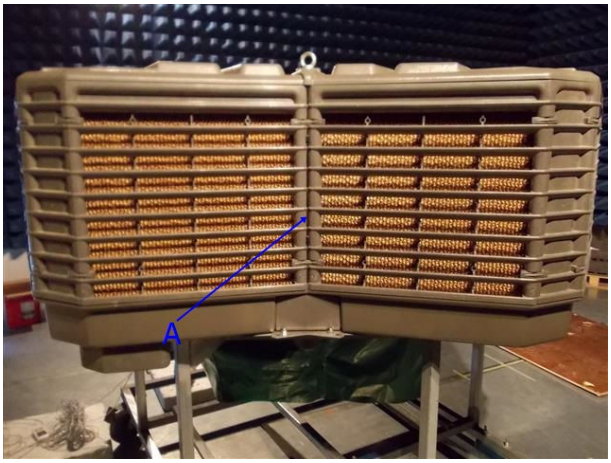
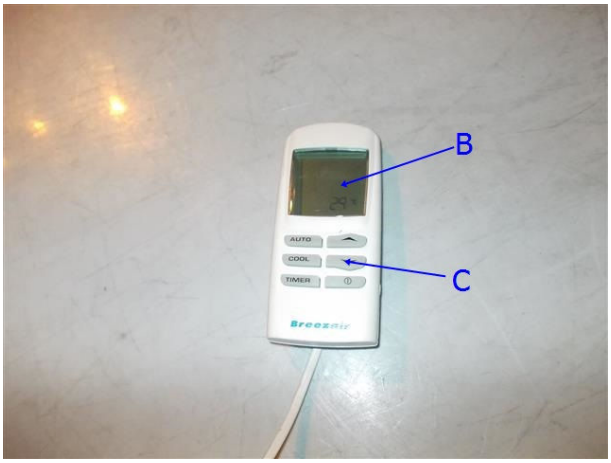


Photograph 37



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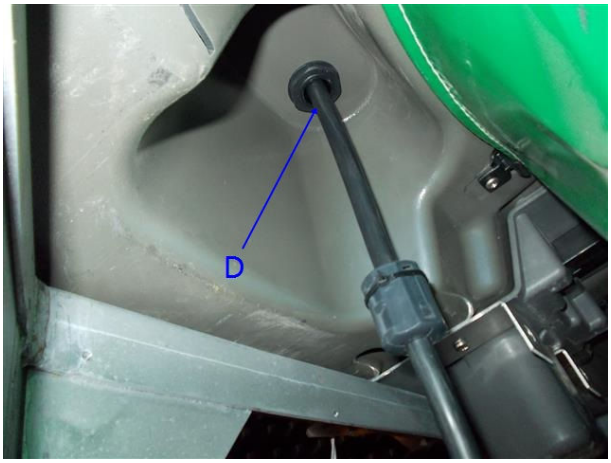
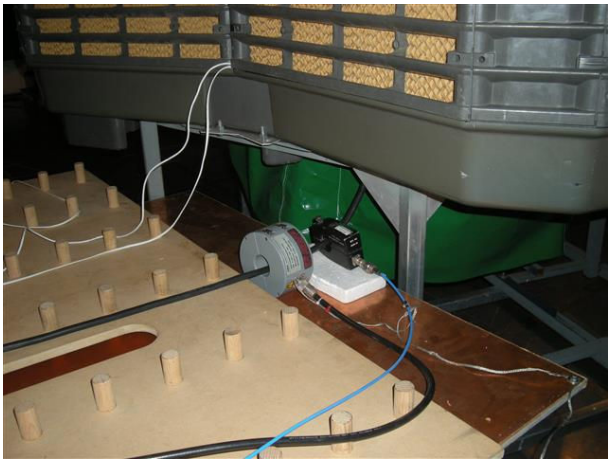


Photograph 39



Photograph 40

Photograph 41

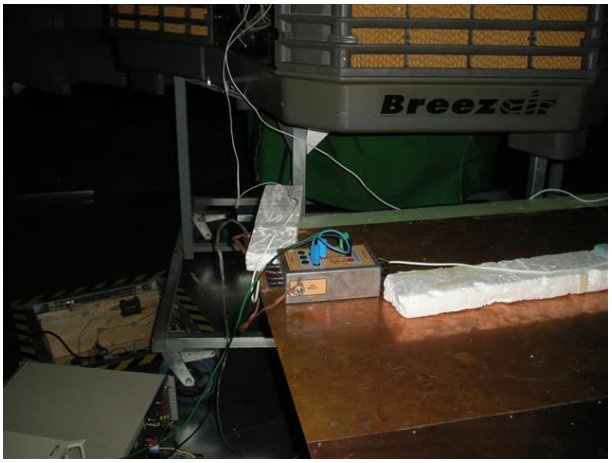
Photograph 42

Photograph 43

Photograph 44

Photograph 45

Photograph 46



Photograph 47

Photograph 48