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# TEST REPORT

## Amp Annealing 001 Induction Heater

*tested to*

## 47 Code of Federal Regulations

## Part 15 - Radio Frequency Devices

## Subpart A and B – Unintentional Radiators

*for*

## Amp Annealing Ltd

This Test Report is issued with the authority of:

**Andrew Cutler - General Manager**

IANZ ACCREDITED LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

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# 1. STATEMENT OF COMPLIANCE

The **Amp Annealing 001 Induction Heater** complies with FCC Part 15 Subparts A and B as a Class B Unintentional Radiator when the methods as described in ANSI C63.4 - 2003 are applied.

# 2. RESULTS SUMMARY

The results of testing, carried out in January 2016 are summarised below.

| Clause | Parameter | Result |
|---|---|---|
| 15.101 | Equipment authorisation requirement. | The device tested would be classed as a Class B computer peripheral when the USB port is attached to a personal computer.<br>Certification or Declaration of Conformity authorisations will apply.<br>The Certification process has been applied to this device. |
| 15.103 | Exempted devices. | Device is not exempt as it contains a digital device and connects to a personal computer using the USB port. |
| 15.107 | Conducted Emissions<br>0.15 - 30 MHz | Complies. |
| 15.109 | Radiated Emissions<br>30 - 1000 MHz | Complies. |
| 15.111 | Antenna Terminal Disturbance<br>30 – 950 MHz | Not applicable. This device does not have an antenna port. |

# 3. INTRODUCTION

This report describes the tests and measurements performed for the purpose of determining compliance with the specification.

**The client selected the test sample.**

**This report relates only to the sample tested.**

**This report contains no corrections or erasures.**

Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both Class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

# 4. CLIENT INFORMATION

| | |
|---|---|
| **Company Name** | Amp Annealing Ltd |
| **Address** | 40 Mile Rd, Bombay |
| **City** | Auckland 2675 |
| **Country** | New Zealand |
| **Contact** | Alex Findlay |

# 5. DESCRIPTION OF TEST SAMPLE

| | |
|---|---|
| **Brand Name** | Amp Annealing |
| **Model** | 001 |
| **Product** | Induction Heater |
| **Manufacturer** | Amp Annealing Ltd |
| **Country of Origin** | New Zealand |
| **Serial Number** | 001 |
| **FCC ID** | 2AGVJ-ANNEALING1 |

The device contains an induction heater that operates on a nominal frequency of 116 kHz.

The device is used for the sealing ammunition cartridges with the induction heater operating on demand for short periods of time.

The device also has a USB port which allows a personal computer to be attached to the device.

A typical use of this connection would be to upgrade or modify the operating software.

Certification of this device has also been sought in accordance with FCC part 18 as Consumer ISM equipment.

The client advises that the highest frequency in use in this device is 21 MHz.

# 6. RESULTS

**Standard**

The sample was tested in accordance with 47 CFR Part 15 Subparts A and B as a Class B computer peripheral.

**Methods and Procedures**

The measurement methods and procedures as described in ANSI C63.4 - 2003 were used.

**Section 15.107: Conducted limits**

Conducted emissions testing was carried out over the frequency range of 150 kHz to 30 MHz at the Laboratory's MacKelvie Street premises in a 2.4 m x 2.4 m x 2.4 screened room.

Measurements on both the phase and neutral lines were made using either a Quasi Peak or an Average detector with a 9 kHz bandwidth.

The supplied conducted emission plot is a combined plot showing the worst case of the Peak, Quasi Peak and Average levels for both phase and neutral.

The device was placed on top of the emissions table, which is 1 m x 1.5 m, 80 cm above the screened room floor which acts as the horizontal ground plane.

In addition the device was positioned 40 cm away from the screened room wall which acts as the vertical ground plane.

The artificial mains network was bonded to the screened room floor.

At all times the device was kept more than 80 cm from the artificial mains network.

Testing was carried out while the device was operating in PC Connect mode which was achieved when a personal computer was attached to the USB port and an appropriate programme was enabled.

When operating in PC Connect mode the ISM device is de-activated and none of the controls on the device can be activated.

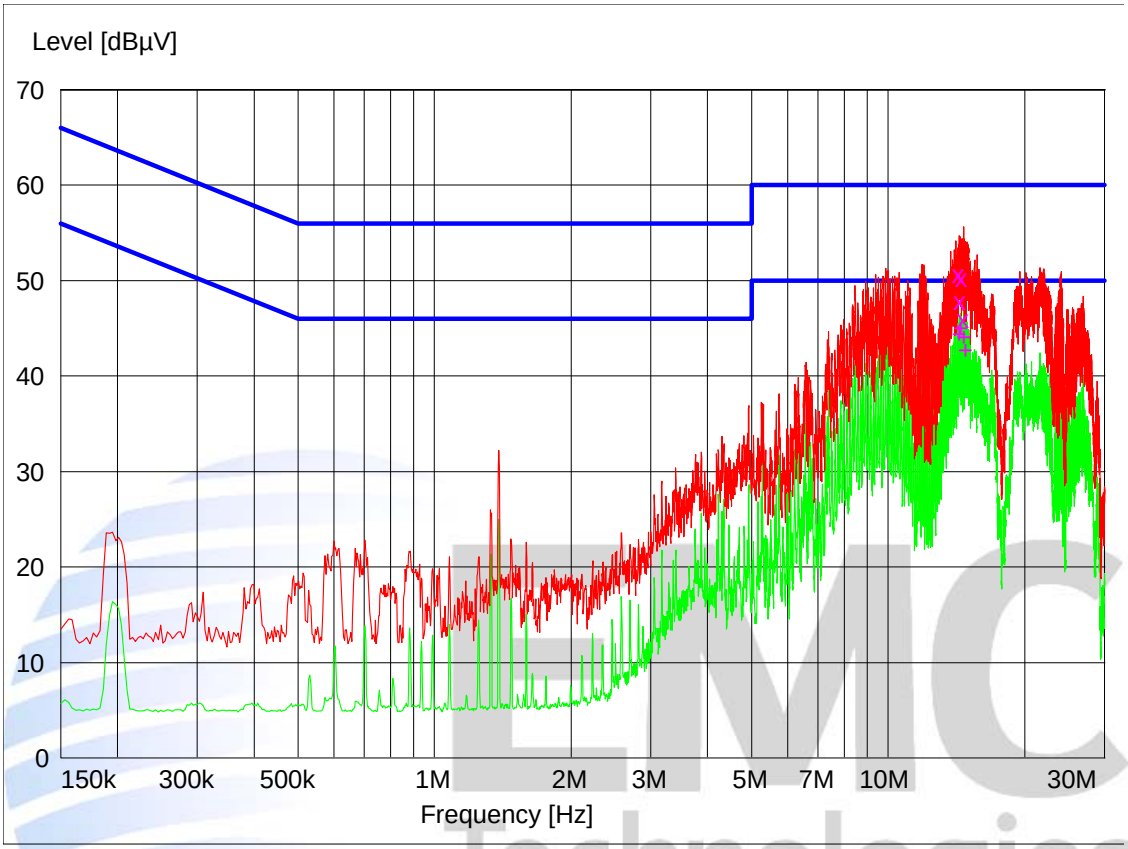
**Result:** Complies

Measurement uncertainty with a confidence interval of 95% is:
- Mains terminal tests (0.15 - 30 MHz) ± 2.2 dB

## Conducted Emissions – AC Input Power Port

| Setup: | Device tested in PC Connect mode when a Laptop Computer running analysis software was attached to the device when the device was powered at 120 Vac 60 Hz. |
|---|---|

| Peak --- | Average -- | Quasi Peak X | Average + |
|---|---|---|---|




Final Quasi-Peak Measurements

| Frequency MHz | Level dBµV | Limit dBµV | Margin dB | Phase | Rechecks dBµV |
|---|---|---|---|---|---|
| 14.339000 | 50.70 | 60.0 | 9.3 | N | |
| 14.438000 | 47.90 | 60.0 | 12.1 | L1 | |
| 14.568500 | 50.30 | 60.0 | 9.7 | L1 | |
| 14.672000 | 46.00 | 60.0 | 14.0 | N | |

Final Average Measurements

| Frequency MHz | Level dBµV | Limit dBµV | Margin dB | Phase | Rechecks dBµV |
|---|---|---|---|---|---|
| 14.334500 | 44.40 | 50.0 | 5.6 | L1 | |
| 14.456000 | 45.00 | 50.0 | 5.0 | N | 45.0 |
| 14.690000 | 44.10 | 50.0 | 5.9 | N | |
| 14.807000 | 42.80 | 50.0 | 7.2 | N | |

**Section 15.109: Radiated emission limits**

Radiated emissions testing was carried out over the frequency range of 30 to 1000 MHz as the highest frequency in use in the device is less than 108 MHz (21 MHz).

Testing was carried out while the device was operating in PC Connect mode which was achieved when a personal computer was attached to the USB port and an appropriate programme was enabled.

When operating in PC Connect mode the ISM device is de-activated and none of the controls on the device can be activated.

When operating in PC Connect mode the ISM device is de-activated and none of the controls on the device can be activated.

Testing was carried out at the laboratory's open area test site - located at 670 Kawakawa-Orere Road, Orere Point, Auckland, New Zealand.

Before testing was carried out, a receiver Self Test and Internal Calibration was undertaken along with a check of all connecting cables and programmed antenna factors.

The device was placed on the test tabletop, which was a total of 0.8 m above the test site ground plane.

Measurements of the radiated field were made with the antenna located at a 3 metre horizontal distance from the boundary of the devices under test.

Testing is carried out by manually scanning between 30 and 1000 MHz in 100 kHz steps while aurally and visually monitoring for emissions.

When an emission is located, it is positively identified and its maximum level is found by rotating the automated turntable, and by varying the antenna height with an automated antenna tower.

During the test, a number of ambient emissions are identified (list of which can be provided upon request).

The emission level is determined in field strength by taking the following into consideration:

Level (dBμV/m) = Receiver Reading (dBμV) + Antenna Factor (dB/m) + Coax Loss (dB)

**Result:** Complies
**Measurement Uncertainty**: ± 4.1 dB

**Radiated Emission Results: 30 – 1000 MHz:**

Testing was carried out when the device was connected to a representative laptop computer (Dell Inspiron 15 300 series serial number HKR1412) using a 1 metre length of USB cable that were supplied by the client.

Testing was carried out with both the device and the laptop computer being powered using 120 Vac 60 Hz.

Testing was carried out when the Amp Annealing supplied software was running with the Read Cal and Auto Tune functions activated.

| Frequency (MHz) | Vertical (dBµV/m) | Horizontal (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Result | Antenna |
|---|---|---|---|---|---|---|
| 31.162 | 39.9 | | 40.0 | 0.1 | Pass | Vertical |
| 32.673 | 38.7 | | 40.0 | 1.3 | Pass | Vertical |
| 35.928 | 33.8 | | 40.0 | 6.2 | Pass | Vertical |
| 47.899 | 28.3 | | 40.0 | 11.7 | Pass | Vertical |
| 59.755 | 38.3 | 31.8 | 40.0 | 1.7 | Pass | Vertical |
| 62.777 | 38.3 | 31.9 | 40.0 | 1.7 | Pass | Vertical |
| 67.194 | 36.6 | 33.2 | 40.0 | 3.4 | Pass | Vertical |
| 71.843 | 36.9 | 32.7 | 40.0 | 3.1 | Pass | Vertical |
| 83.931 | 34.0 | 32.1 | 40.0 | 6.0 | Pass | Vertical |
| 107.830 | 33.8 | 29.8 | 43.5 | 9.7 | Pass | Vertical |
| 119.863 | 39.6 | 36.1 | 43.5 | 3.9 | Pass | Vertical |
| 131.623 | 38.1 | 32.8 | 43.5 | 5.4 | Pass | Vertical |
| 143.367 | 33.1 | 32.5 | 43.5 | 10.4 | Pass | Vertical |
| 203.511 | | 30.1 | 43.5 | 13.4 | Pass | Horizontal |
| 327.849 | 24.3 | 29.5 | 46.0 | 16.5 | Pass | Horizontal |
| 339.972 | | 27.3 | 46.0 | 18.7 | Pass | Horizontal |
| 363.651 | | 27.1 | 46.0 | 18.9 | Pass | Horizontal |

All other emissions observed were observed to have a margin to the limit that exceeded at least 15 dB when observations were made in both vertical and horizontal polarisations between 30 – 1000 MHz.

# 7. TEST EQUIPMENT USED

| Instrument | Manufacturer | Model | Serial No | Asset Ref | Period | Cal Due |
|---|---|---|---|---|---|---|
| Aerial Controller | EMCO | 1090 | 9112-1062 | RFS 3710 | Not applic | Not applic |
| Aerial Mast | EMCO | 1070-1 | 9203-1661 | RFS 3708 | Not applic | Not applic |
| Biconical Antenna | Schwarzbeck | BBA 9106 | 9594 | 3680 | 3 years | 3 Feb 2018 |
| Log Periodic | Schwarzbeck | VUSLP 9111 | 9111-228 | 3785 | 3 years | 1 Dec 2017 |
| Mains Network | Rohde & Schwarz | ESH 2-Z5 | 881362/034 | 3628 | 2 years | 23 Oct 2016 |
| Receiver | Rohde & Schwarz | ESHS 10 | 838693/002 | 3800 | 1 year | 30 June 2016 |
| Software | Rohde & Schwarz | ESKI 140 | - | - | - | - |
| Receiver | Rohde & Schwarz | ESIB 40 | 100171 | EMC 4003 | 1 year | 16 Apr 2016 |
| Turntable | EMCO | 1080-1-2.1 | 9109-1578 | RFS 3709 | Not applic | Not applic |
| VHF Balun | Schwarzbeck | VHA 9103 | 9594 | 3696 | 3 years | 3 Feb 2018 |

# 8. ACCREDITATIONS

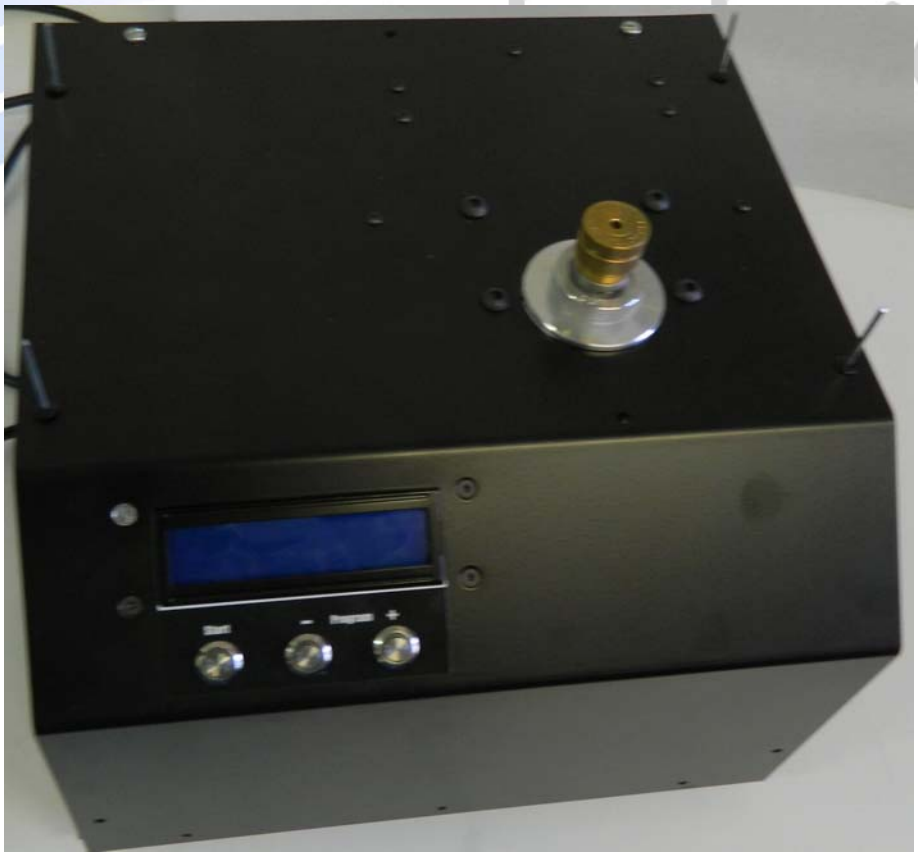
Testing was carried out in accordance with EMC Technologies Ltd registration with the Federal Communications Commission as a listed facility, registration number: 90838, which was updated in June 2014.

All testing was carried out in accordance with the terms of EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025.

All measurement equipment has been calibrated in accordance with the terms of the EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025.

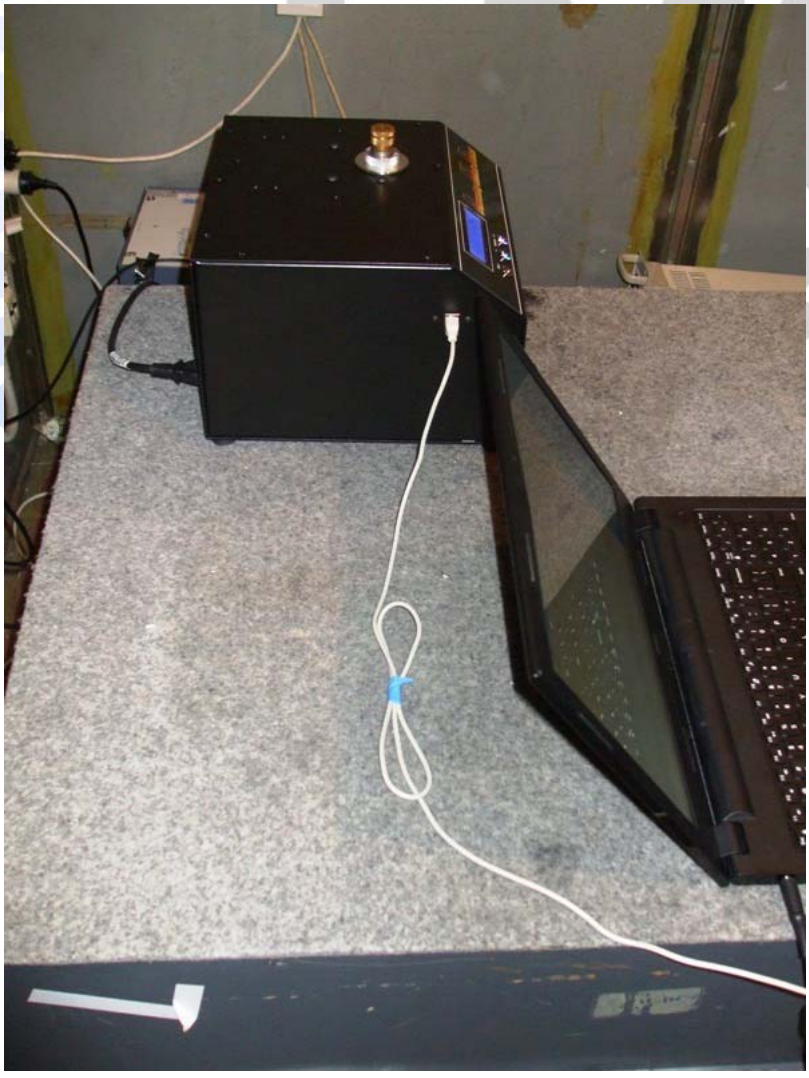
International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with various accreditation bodies in a number of economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

# 9. PHOTOGRAPHS


Ancillary equipment

Conducted emissions test set up



Radiated emissions test set up photos