

Technical Report

Field Tests on RESLO Ground Enhancement Compound for Lightning Protection International Pty Ltd

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A handwritten signature in purple ink that reads "Michael Austin".

Version Control

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1. Introduction

RESLO Ground Enhancement Compound is used in earthing systems to reduce the resistivity of the soil surrounding earth system electrodes, effectively reducing the resistance of the overall earth system.

The purpose of these field tests is to measure, and monitor over time, the resistance of a number of sample earthing networks – one set treated with RESLO enhancement compound as per the manufacturer’s instructions, and a second set untreated.

The earthing systems were originally installed at the test site in November 2005, and resistance measurements of both the treated and untreated sets were taken over the period Nov 2005 – Nov 2007 by others [1].

Additional measurements of the two sets of earthing systems were undertaken on the 27th November 2014, and the results from these tests have been compiled along with the results from the previous testing to show the performance comparison between the treated and untreated systems over an extended period.

This report has been prepared using the data obtained from these tests as well as the data taken from the original series of tests.

2. Test Arrangement

The test arrangement is described in detail in [1], however the site layout and details of the earthing systems under test is summarised in Figure 1 for completeness.

3. Test Procedure

Resistance measurements were taken with an LEM Saturn GEO X earth resistance meter (Serial Number S061901309A5, Calibration Certificate TR0023). Measurements were made using the industry three electrode Fall of Potential method. For each earth system, three measurements were made, each with different electrode placing to confirm the “voltage” electrode was in the plateau section of the fall of potential.

At the time testing was undertaken, conditions were dry, with ambient temperature 15°C and 52% relative humidity, and there had been a period of light rain the previous day.

On the day of and for the month prior to testing, the soil surrounding the test site appeared dry and felt dry to the touch. Climate data [2] indicates that the ground moisture content could well have been reduced during the period between 2007 and the end of 2014. 2014 marked the eighth consecutive year with mean temperature throughout Tasmania being above average [3]. In 2014 Hobart had below average rainfall, and the highest mean maximum temperature since records began in 1910. The mean minimum temperature was also very much above average.

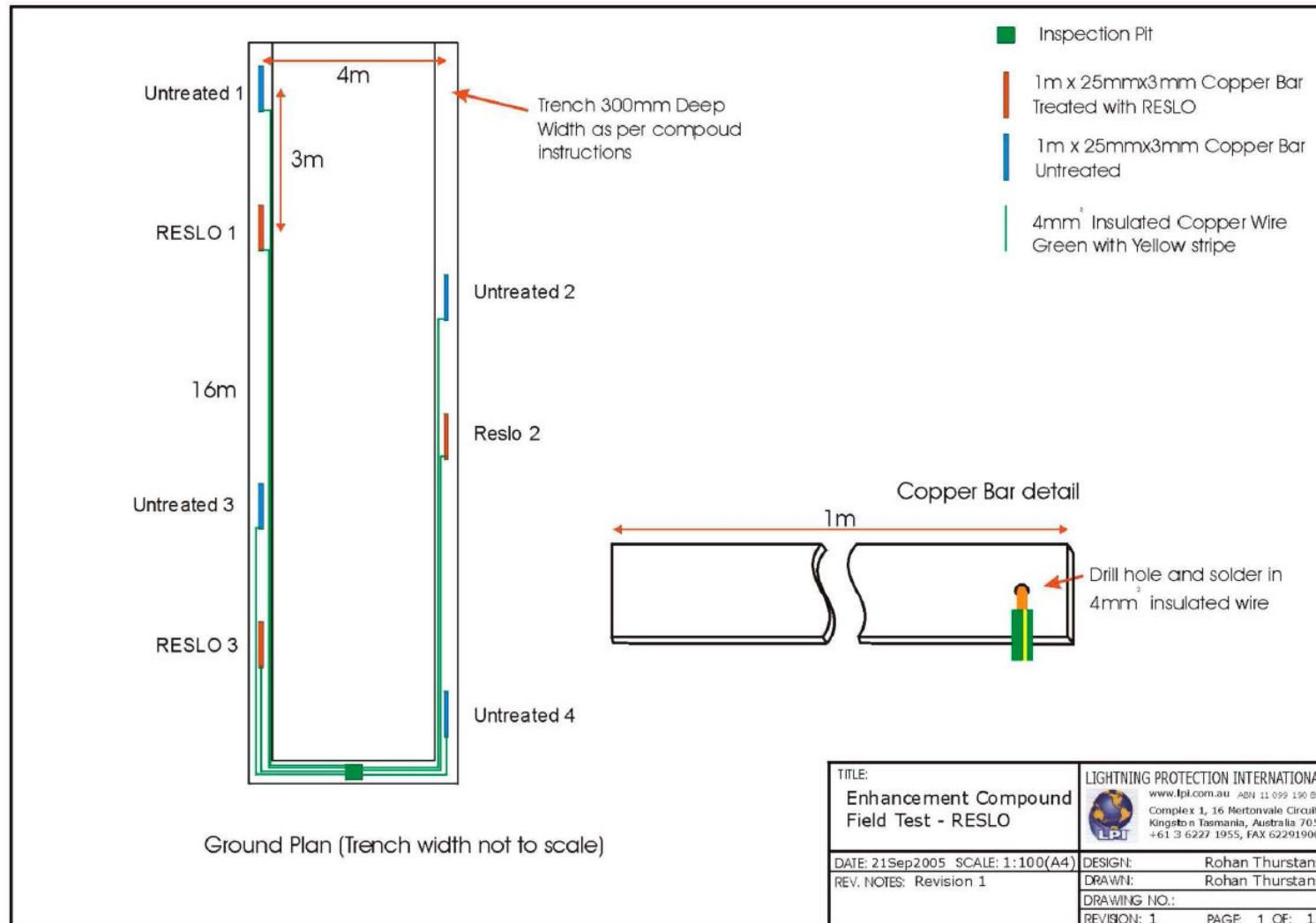


Figure 1 - Test Site Layout

4. Results

Results from previous testing [1] are shown in Table 1.

Date	RESLO 1	RESLO 2	RESLO 3	Untreated 1	Untreated 2	Untreated 3	Untreated 4	RESLO Average	Untreated Average
09/11/05	191	129	129	857	710	857	432	150	714
10/11/05	153	116	114	430	412	403	313	128	390
17/11/05	133	121	112	422	385	487	350	122	411
29/11/05	106	110	88	302	298	307	322	101	307
18/01/06	318	107	138	1033	173	662	383	188	563
28/02/06		130	507		307		907	319	607
18/05/06	283	87	152	633	432	420	500	174	496
18/08/06	407	126	425	847	557	1007	553	319	741
14/11/06	1366	132	833	2553	544	4053	1698	777	2212
09/03/07	755	241	358	1299	786	1125	1918	451	1282

Table 1- Results of resistance tests 2005 - 2007

Results from the most recent testing undertaken on 27th November 2014 are shown in Table 2.

Location	Trial 1	Trial 2	Trial 3	Average
	Ω	Ω	Ω	Ω
RESLO 1	1711	1713	1712	1712
RESLO 2	1119	1122	1121	1121
RESLO 3	1157	1164	1166	1162
UNTREATED 1	3330	3340	3340	3337
UNTREATED 2	2860	3220	2863	2862
UNTREATED 3	3130	3140	3140	3137
UNTREATED 4	2275	2563	2280	2278

Table 2- Results of resistance tests 27th November 2014

In calculating the averages for the latest set of data, two data points were discarded as “outliers” due to these results being significantly different from the other two results in the data set. These discarded results corresponded to Trial 2 measurements for the UNTREATED 2 and UNTREATED 4 earthing systems (highlighted in yellow in Table 2).

All data points were combined and a graph of resistance over time was produced. These are shown in Table 3.

Date	RESLO 1	RESLO 2	RESLO 3	Untreated 1	Untreated 2	Untreated 3	Untreated 4	RESLO Average	Untreated Average
9/11/05	191	129	129	857	710	857	432	150	714
10/11/05	153	116	114	430	412	403	313	128	390
17/11/05	133	121	112	422	385	487	350	122	411
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14/11/06	1366	132	833	2553	544	4053	1698	777	2212
9/03/07	755	241	358	1299	786	1125	1918	451	1282
27/11/14	1712	1121	1162	3337	2862	3137	2278	1332	2904

Table 3- Results of resistance tests November 2005 – November 2014

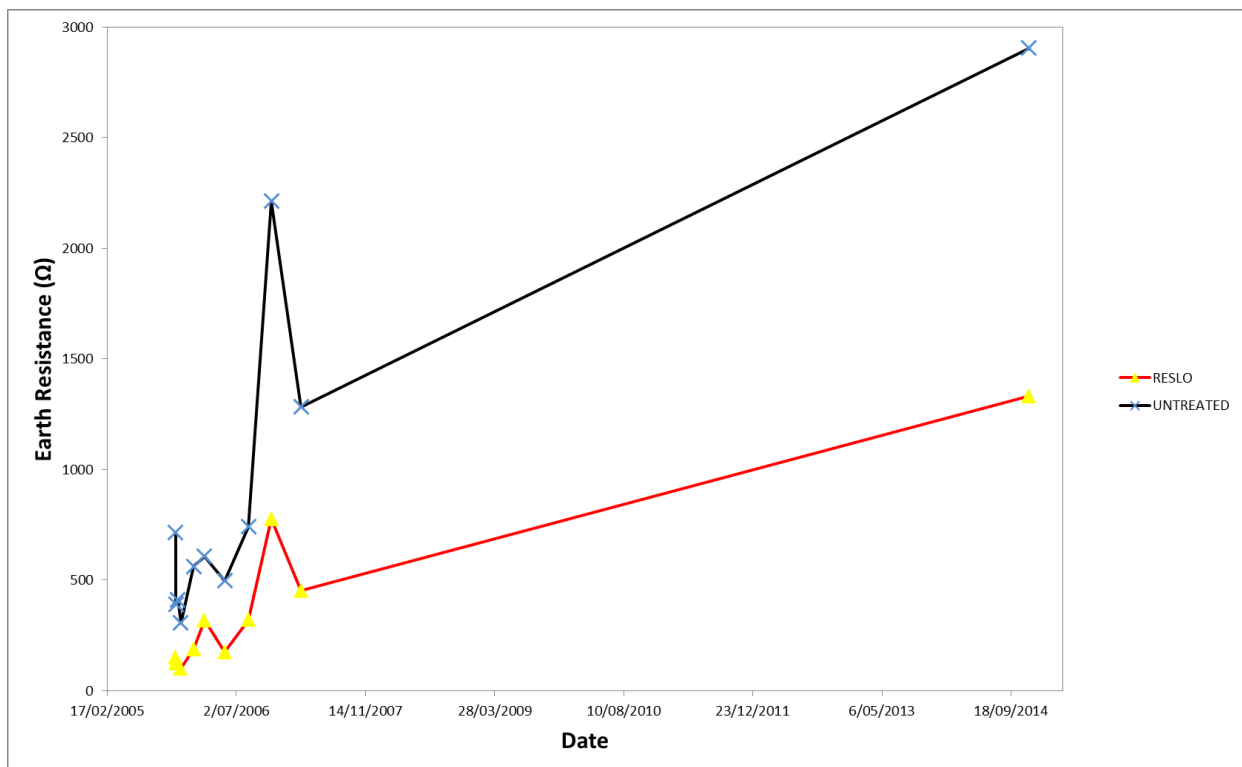


Figure 2 - Resistance variation with time (all data sets)

5. Conclusions

Previous test results consistently showed that the earthing systems treated with RESLO had significantly lower resistance values when compared to those for the untreated systems. The ratio of Untreated/RESLO treated resistance values varied between 4.76 when the systems were first installed down to a low of 1.90 a few months later, with an average ratio of 3.0. The data showed a gradual overall increase in system resistance with time, however the RESLO treated systems always achieved the lowest resistance figures.

The latest test results show a similar trend, in that the RESLO treated systems are around 2.2 times lower in overall resistance when compared to the untreated systems. Absolute resistance values have shown a steady increase over the testing period, which would seem indicative of an increase in the local soil resistivity, particularly given the ratio between untreated and RESLO treated has remained relatively constant over this same period.

It can be concluded then that over the 9 year time period for which testing has been undertaken, RESLO provides a consistently lower earth resistance when compared to a similar system that has not been treated.

6. References

1. D. Edwards & R. Thurstans, "*LPI RESLO FIELD TESTS, November 2005– March 2007*", 2nd October 2007.
2. Australian Bureau of Meteorology (2014). Climate summaries archive. Retrieved from http://www.bom.gov.au/climate/current/statement_archives.shtml?region=tas&period=annual
3. Australian Bureau of Meteorology (2014). Tasmania in 2014: a warm and dry year. Retrieved from <http://www.bom.gov.au/climate/current/annual/tas/archive/2014.summary.shtml>