ENERVEN™
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Test Report on
Earth Enhancing Compound
LPI SRIMPLUS-20

Report Number: 179/21/1789N **Report Date: 19 March 2021**

Calibrated by:
Lech Bartnik
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Checked by:
Lech Bartnik
Authorised Signatory

W/O: 20210264e

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CLIENT DETAILS

Reference:	LPI_SRIMPLUS_ERT2021-001
Name:	Lightning Protection International Pty Ltd.
Address:	49 Patriach Drive, Huntingfield TAS 7055
Attention:	Dr Franco D'Alessandro

ITEM DETAILS

Date Received:	16 February 2021
Manufacturer:	Lightning Protection International
Product Name:	LPI Srimplus-20

TEST DETAILS

Work Order:	20210264e
Date of Test:	17 February - 24 February 2021 and 1st and 13th of March
Test Site:	Enerven Marleston
Nature of Test:	Resistance measurement of 3 samples.
Test Method:	As defined in IEC 62561-7. Measurements taken at 4 frequencies: 50, 95, 115 and 128Hz sinusoidal signal and at 2 test currents: 100 and 300mA. Additional tests carried out at 1kHz, 5kHz, 10kHz and 20kHz, 100mA.
Test Arrangements:	See photo in Appendix 1
Conditions of Test:	20°C ±1°C, Humidity 45-60% Samples prepared as per customer's instructions.
Reference Equipment:	Multifunction Calibrator Wavetek 9100 S/N 30633, calibraton due date 30 March 2021 Reference Multimeter Fluke 8846A S/N1397037, calibration due date 12 October 2021
Results of Tests:	Refer to tables.
Uncertainty of Measurement:	Resistance: ±0.1%rdg ≤10Ω Estimated for a 95% probability.
Test Pass Criteria:	Resistivity <0.1Ωm.

Uncertainty
The stated uncertainties have been estimated for 95% confidence limits. Unless stated otherwise in the report a coverage factor of k=2 has been used.
The uncertainties apply at the time of measurement and at the stated 'Conditions of Test'. They do not consider drift after the calibration date nor do they take into account the environment and the conditions in which the instrument may be used.

Note: Resistivity calculations are not NATA endorsed.

RESULTS

Day/Date	Time	Current	Frequency	Resistance[Ω]			Calculated Resistivity [Ωm]			Test Result
				Sample 1	Sample 2	Sample3	Sample 1	Sample 2	Sample3	
1 17/02/2021	11:05	0.1	50	1.113	0.897	1.193	0.080	0.065	0.086	Pass
		0.1	95	0.932	0.850	1.196	0.067	0.061	0.086	Pass
		0.1	115	0.946	0.874	1.196	0.068	0.063	0.086	Pass
		0.1	128	0.938	0.847	1.205	0.068	0.061	0.087	Pass
		0.3	50	0.928	0.882	1.121	0.067	0.064	0.081	Pass
		0.3	95	0.914	0.864	1.103	0.066	0.062	0.079	Pass
		0.3	115	0.908	0.860	1.100	0.065	0.062	0.079	Pass
		0.3	128	0.918	0.854	1.099	0.066	0.062	0.079	Pass
	+1	0.1	50	0.911	0.878	1.046	0.066	0.063	0.075	Pass
		0.1	95	0.890	0.860	1.031	0.064	0.062	0.074	Pass
		0.1	115	0.896	0.847	1.025	0.065	0.061	0.074	Pass
		0.1	128	0.893	0.846	1.022	0.064	0.061	0.074	Pass
		0.3	50	0.903	0.865	1.037	0.065	0.062	0.075	Pass
		0.3	95	0.893	0.854	1.025	0.064	0.061	0.074	Pass
		0.3	115	0.890	0.849	1.021	0.064	0.061	0.074	Pass
		0.3	128	0.889	0.847	1.019	0.064	0.061	0.073	Pass
	+4	0.1	50	0.925	0.884	1.160	0.067	0.064	0.084	Pass
		0.1	95	0.920	0.875	1.136	0.066	0.063	0.082	Pass
		0.1	115	0.915	0.872	1.131	0.066	0.063	0.081	Pass
		0.1	128	0.912	0.871	1.128	0.066	0.063	0.081	Pass
		0.3	50	0.922	0.884	1.157	0.066	0.064	0.083	Pass
		0.3	95	0.912	0.875	1.138	0.066	0.063	0.082	Pass
		0.3	115	0.909	0.872	1.132	0.065	0.063	0.082	Pass
		0.3	128	0.907	0.870	1.128	0.065	0.063	0.081	Pass
	+8	0.1	50	1.061	1.101	1.221	0.076	0.079	0.088	Pass
		0.1	95	1.046	1.089	1.204	0.075	0.078	0.087	Pass
		0.1	115	1.041	1.083	1.197	0.075	0.078	0.086	Pass
		0.1	128	1.037	1.080	1.193	0.075	0.078	0.086	Pass
		0.3	50	1.063	1.101	1.219	0.077	0.079	0.088	Pass

		0.3	95	1.050	1.085	1.207	0.076	0.078	0.087	Pass
		0.3	115	1.046	1.080	1.202	0.075	0.078	0.087	Pass
		0.3	128	1.047	1.077	1.201	0.075	0.078	0.086	Pass
2	9:15	0.1	50	1.115	1.198	1.276	0.080	0.086	0.092	Pass
18/02/2021		0.1	95	1.099	1.187	1.263	0.079	0.085	0.091	Pass
		0.1	115	1.094	1.182	1.256	0.079	0.085	0.090	Pass
		0.1	128	1.091	1.178	1.251	0.079	0.085	0.090	Pass
		0.3	50	1.113	1.202	1.272	0.080	0.087	0.092	Pass
		0.3	95	1.092	1.190	1.262	0.079	0.086	0.091	Pass
		0.3	115	1.088	1.185	1.253	0.078	0.085	0.090	Pass
		0.3	128	1.085	1.181	1.248	0.078	0.085	0.090	Pass
	17:30	0.1	50	1.098	1.133	1.168	0.079	0.082	0.084	Pass
		0.1	95	1.079	1.115	1.145	0.078	0.080	0.082	Pass
		0.1	115	1.074	1.109	1.138	0.077	0.080	0.082	Pass
		0.1	128	1.070	1.106	1.134	0.077	0.080	0.082	Pass
		0.3	50	1.133	1.133	1.168	0.082	0.082	0.084	Pass
		0.3	95	1.078	1.116	1.146	0.078	0.080	0.082	Pass
		0.3	115	1.072	1.110	1.138	0.077	0.080	0.082	Pass
		0.3	128	1.069	1.106	1.134	0.077	0.080	0.082	Pass
3	9:15	0.1	50	1.000	1.008	1.026	0.072	0.073	0.074	Pass
19/02/2021		0.1	95	0.981	0.995	1.020	0.071	0.072	0.073	Pass
		0.1	115	0.975	0.991	1.004	0.070	0.071	0.072	Pass
		0.1	128	0.971	0.989	1.001	0.070	0.071	0.072	Pass
		0.3	50	1.007	1.007	1.026	0.073	0.072	0.074	Pass
		0.3	95	0.988	0.995	1.010	0.071	0.072	0.073	Pass
		0.3	115	0.982	0.991	1.004	0.071	0.071	0.072	Pass
		0.3	128	0.978	0.988	1.001	0.070	0.071	0.072	Pass
	17:35	0.1	50	1.008	1.026	1.001	0.073	0.074	0.072	Pass
		0.1	95	0.996	0.965	0.986	0.072	0.069	0.071	Pass
		0.1	115	0.989	0.961	0.981	0.071	0.069	0.071	Pass
		0.1	128	0.985	0.959	0.978	0.071	0.069	0.070	Pass
		0.3	50	1.004	1.026	1.000	0.072	0.074	0.072	Pass
		0.3	95	0.984	0.965	0.981	0.071	0.069	0.071	Pass

		0.3	115	0.978	0.961	0.976	0.070	0.069	0.070	Pass
		0.3	128	0.974	0.958	0.974	0.070	0.069	0.070	Pass
4	14:50	0.1	50	0.993	0.943	0.989	0.071	0.068	0.071	Pass
20/02/2021		0.1	95	0.981	0.935	0.976	0.071	0.067	0.070	Pass
		0.1	115	0.977	0.931	0.972	0.070	0.067	0.070	Pass
		0.1	128	0.974	0.929	0.970	0.070	0.067	0.070	Pass
		0.3	50	0.993	0.945	0.988	0.072	0.068	0.071	Pass
		0.3	95	0.981	0.935	0.976	0.071	0.067	0.070	Pass
		0.3	115	0.976	0.932	0.972	0.070	0.067	0.070	Pass
		0.3	128	0.974	0.930	0.970	0.070	0.067	0.070	Pass
5	15:40	0.1	50	1.004	0.950	1.003	0.072	0.068	0.072	Pass
21/02/021		0.1	95	0.993	0.938	0.992	0.071	0.068	0.071	Pass
		0.1	115	0.989	0.935	0.988	0.071	0.067	0.071	Pass
		0.1	128	0.987	0.933	0.986	0.071	0.067	0.071	Pass
		0.3	50	1.006	0.947	1.003	0.072	0.068	0.072	Pass
		0.3	95	0.995	0.938	0.992	0.072	0.068	0.071	Pass
		0.3	115	0.991	0.933	0.988	0.071	0.067	0.071	Pass
		0.3	128	0.989	0.933	0.986	0.071	0.067	0.071	Pass
6	9:35	0.1	50	0.980	0.942	0.989	0.071	0.068	0.071	Pass
22/02/2021		0.1	95	0.970	0.934	0.993	0.070	0.067	0.072	Pass
		0.1	115	0.965	0.932	0.990	0.069	0.067	0.071	Pass
		0.1	128	0.962	0.930	0.988	0.069	0.067	0.071	Pass
		0.3	50	0.980	0.977	1.003	0.071	0.070	0.072	Pass
		0.3	95	0.965	0.936	0.994	0.069	0.067	0.072	Pass
		0.3	115	0.960	0.933	0.990	0.069	0.067	0.071	Pass
		0.3	128	0.957	0.931	0.988	0.069	0.067	0.071	Pass
	19:15	0.1	50	0.976	0.925	1.006	0.070	0.067	0.072	Pass
		0.1	95	0.961	0.918	0.996	0.069	0.066	0.072	Pass
		0.1	115	0.956	0.916	0.993	0.069	0.066	0.071	Pass
		0.1	128	0.953	0.915	0.991	0.069	0.066	0.071	Pass
		0.3	50	0.976	0.928	1.005	0.070	0.067	0.072	Pass
		0.3	95	0.961	0.921	0.996	0.069	0.066	0.072	Pass
		0.3	115	0.956	0.919	0.992	0.069	0.066	0.071	Pass

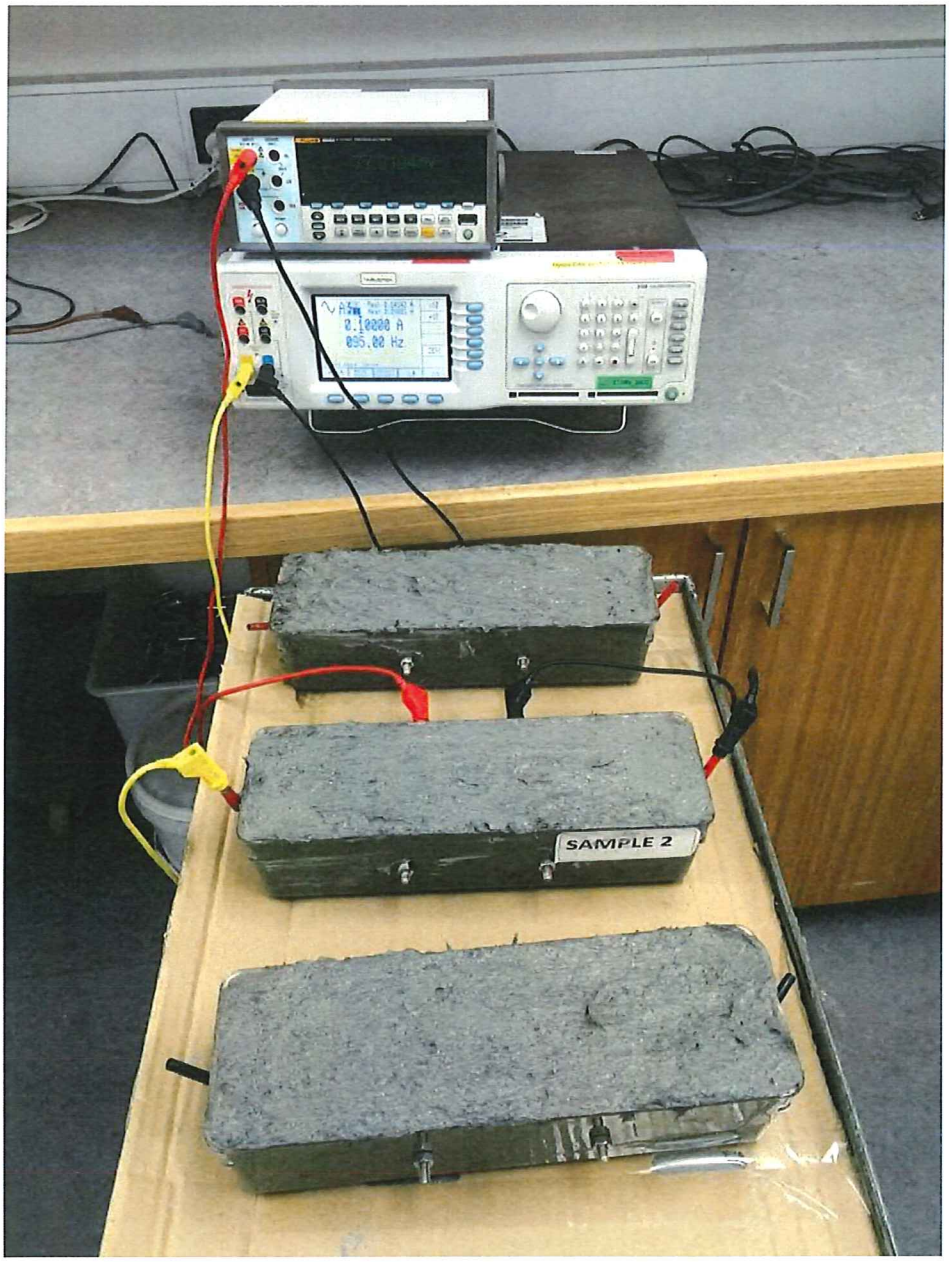
		0.3	128	0.954	0.917	0.991	0.069	0.066	0.071	Pass
7	8:45	0.1	50	0.990	0.931	1.000	0.071	0.067	0.072	Pass
23/02/2021		0.1	95	0.975	0.925	0.992	0.070	0.067	0.071	Pass
		0.1	115	0.970	0.923	0.989	0.070	0.066	0.071	Pass
		0.1	128	0.968	0.921	0.987	0.070	0.066	0.071	Pass
		0.3	50	0.982	0.932	1.002	0.071	0.067	0.072	Pass
		0.3	95	0.969	0.926	0.993	0.070	0.067	0.071	Pass
		0.3	115	0.964	0.923	0.990	0.069	0.066	0.071	Pass
		0.3	128	0.961	0.922	0.988	0.069	0.066	0.071	Pass
	17:00	0.1	50	0.990	0.933	0.983	0.071	0.067	0.071	Pass
		0.1	95	0.981	0.926	0.976	0.071	0.067	0.070	Pass
		0.1	115	0.976	0.923	0.977	0.070	0.066	0.070	Pass
		0.1	128	0.973	0.922	0.971	0.070	0.066	0.070	Pass
		0.3	50	0.990	0.935	0.993	0.071	0.067	0.072	Pass
		0.3	95	0.975	0.927	1.000	0.070	0.067	0.072	Pass
		0.3	115	0.970	0.925	1.003	0.070	0.067	0.072	Pass
		0.3	128	0.968	0.923	1.003	0.070	0.066	0.072	Pass
8	11:45	0.1	50	0.996	0.924	0.994	0.072	0.067	0.072	Pass
24/02/2021		0.1	95	0.975	0.919	0.987	0.070	0.066	0.071	Pass
		0.1	115	0.972	0.916	0.984	0.070	0.066	0.071	Pass
		0.1	128	0.969	0.915	0.983	0.070	0.066	0.071	Pass
		0.3	50	0.989	0.928	0.994	0.071	0.067	0.072	Pass
		0.3	95	0.977	0.919	0.986	0.070	0.066	0.071	Pass
		0.3	115	0.973	0.917	0.984	0.070	0.066	0.071	Pass
		0.3	128	0.970	0.916	0.983	0.070	0.066	0.071	Pass
1/03/2021	16:50	0.1	1kHz	0.920	0.821	0.906	0.066	0.059	0.065	Pass
		0.1	5kHz	0.866	0.780	0.872	0.062	0.056	0.063	Pass
		0.1	10kHz	0.837	0.756	0.854	0.060	0.054	0.061	Pass
		0.1	20kHz	0.807	0.732	0.834	0.058	0.053	0.060	Pass
13/03/2021	11:30	0.1	50	0.897	0.769	0.911	0.065	0.055	0.066	Pass
		0.1	95	0.884	0.768	0.910	0.064	0.055	0.066	Pass
		0.1	115	0.882	0.768	0.910	0.064	0.055	0.065	Pass
		0.1	128	0.882	0.768	0.910	0.063	0.055	0.065	Pass

		0.3	50	0.922	0.769	0.911	0.066	0.055	0.066	Pass
		0.3	95	0.883	0.768	0.909	0.064	0.055	0.065	Pass
		0.3	115	0.883	0.768	0.909	0.064	0.055	0.065	Pass
		0.3	128	0.883	0.768	0.909	0.064	0.055	0.065	Pass
		0.1	1kHz	0.887	0.762	0.895	0.064	0.055	0.064	Pass
		0.1	10kHz	0.868	0.747	0.883	0.063	0.054	0.064	Pass

Overall Test Result: PASS.

APPENDIX 1.

The calibrator Wavetek 9100 was used as a current source and the Fluke 8846A 6½ digit multimeter was used to measure the AC voltage.



APPENDIX 2.
The resistivity of the samples was calculated with the formula:

$$\rho = \frac{RA}{L}$$

Where: R- resistance masured, A – cross-sectional area of the sample between sensing electrodes, L – spacing between the inner edges of the sensing electrodes. The A was measured to be 6475mm^2 while L: 90mm.
Hence:

$$\rho = 0.072R$$