INSTITUTO TECNOLÓGICO DE LA ENERGÍA

TEST REPORT
IE-ITE-160896/02/EN

HIGH VOLTAGE

Test:	Lightning Protection System Components (LPSC)
Test methodology:	IEC 62561-2:2012
Equipment tested:	Air terminal – Guardian CAT-1-G
Quantity:	3
Code:	ME-ITE-160896-04 to ME-ITE-160896-06
Client:	Lightning Protection International Pty Ltd
Issued by:	INSTITUTO TECNOLÓGICO DE LA ENERGIA (ITE)
Test location site:	ITE - Edificio Institutos 8A, U.P.V. Camino de Vera, s/n 46022 Valencia (España)

The results present in this report, in accordance with requested tests in the section 3, are exclusively referred to samples subjected to test identified in section 5. These samples were tested in the manner and the date pointed out in the sections 4 and 5 respectively.

Performed: **Position:**	Jorge Moreno Rodriguez Lab Technician	**Reviewed:** **Position:**	Anabel Soria Esteve Lab Coordinator
Date: 30/01/2017	**Sign:**	**Date:** 30/01/2017	**Sign:**

This report is comprised of 15 pages

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1. General characteristics

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The Instituto Tecnológico de la Energía (**ITE**) guarantees the accuracy of the data and results presented in this document obtained from the measurements of the equipment tested on the dates and under the conditions here established.

The **ITE** guarantees information confidentiality as regards test results. All data related to the tested item and testing procedure will be confidential.

1.2. Important observations

1. Reproduction of this report is only allowed whenever the result be the exact copy from the original and the procedure be fully developed.
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4. This test report only refers to the requested tests that are reflected in this document.
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2. Customer data

Company name: Lightning Protection International Pty Ltd

C.I.F./N.I.F./Passport: 11099190897

Address: 49 Patriarch Drive, Huntingfield, 7055, Australia

3. Requested tests

The requested tests are performed according to the following parts of the standard:

TEST NUMBER	DESCRIPTION	SECTION OF THE IEC 62561-2
1	Electrical Resistivity Test	5.2.6
2	Environmental Test	5.2.4
3	Marking Test	5.5
4	Electric Test	5.4.3

4. Test procedures

4.1. Test method identification

For each test the appropriate procedure has been followed, based on the instructions described in each part of the standard.

4.2. Deviation, addition or exclusion to the test method

N.P.

4.3. Additional information

The expanded measurement uncertainty is obtained by multiplying the standard uncertainty of measurement by the coverage factor k = 2, that for a normal distribution, corresponds to a coverage probability of approximately 95%.

5. Sample data

Unit under test: Air Terminals (AT)

Sample ID	ITE ID	Manufacturer reference	Description
3308	ME-ITE-160896/04	GUARDIAN CAT-1-G	Small gold AT
3309	ME-ITE-160896/05	GUARDIAN CAT-1-G	Small gold AT
3310	ME-ITE-160896/06	GUARDIAN CAT-1-G	Small gold AT
-	ME-ITE-160896/19	-	Aluminium rod
-	ME-ITE-160896/20	-	Aluminium rod
-	ME-ITE-160896/21	-	Aluminium rod

6. Environmental conditions

Each test has been performed under the specified environmental conditions.

7. Tests results

The tests specified in section "*Required tests*" in accordance with the standard indicated in section "*Test procedures*" of the sample as is described in section "*Samples Data*" are presented in the table below:

TEST NUMBER	DESCRIPTION	SECTION OF THE IEC 62561-2	Compliance [1]
1	Electrical Resistivity Test	5.2.6	YES
2	Environmental Test	5.2.4	YES
3	Marking Test	5.5	YES
4	Electric Test	5.4.3	YES

Notes: Electric test has been applied to the air terminals due to customer's needs.

[1] N.P.: Not applicable
N.R.: Not performed
YES: Compliance with the test
NO: Not compliance with the test

8. Summary

The test results specified in the section "Requested tests" performed according to what is established in the section "Test procedures" and upon the samples described in section "Sample data" are reported herein in the section "Test results".

This report only applies to the items under test whose identification is in the section "Sample data" of this document.

Valencia, January 30th, 2017

Stamp of the institution

APPENDIX A. TEST RESULTS

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Electrical Resistivity Test (Part 5.2.6. IEC 62561-2:2012)

The resistivity of the material was measured in a 1,2 m long aluminum rod with a micro-ohmeter and the reading corrected to 20 °C using an appropriate correction factor if necessary.

Besides, the results of the material resistivity has been checked on the material of the central part of each air terminal sample.

The resistivity of each sample has been calculated according to this formula:

$$\rho = \frac{AR}{l}$$

ρ = resistivity; A = area; R = resistance; l = length

The measurement was done with a four-wire method for eliminating errors due to lead and contact resistances. This is a method associated with low resistances ohmmeters, which assures more accurate results.

Those are the results of the Electrical Resistivity Test:

Model	Resistivity (μΩm)	Resistivity limit (μΩm)	Compliance
ME-ITE-160896/19	0,0263	0,036	YES
ME-ITE-160896/20	0,0264	0,036	YES
ME-ITE-160896/21	0,0261	0,036	YES

NOTE 1: All the tests were performed at 20 °C. No correction factors were applied.

	Testing date	Temperature (°C)	Relative Humidity (%)	Pressure (mbar)
Start	2016/10/28	20,2	56,1	997
Finish	2016/10/28	20,4	54,8	996,8

Environmental Test (Part 5.2.4. IEC 62561-2:2012)

The specimens have been subjected to an environmental salt mist test followed by a humid sulphurous atmosphere test as specified in Annex A of standard IEC 62561-2:2012 (Part A.1 and A.2).

Salt mist test

Test conducted according to the UNE-EN 60068-2-52; except sections 7, 10 and 11 which are not applicable, with a severity degree two

Humid sulphurus atmosphere test

Test conducted according to UNE-EN ISO 6988 with 7 cycles and SO2 concentration of 667 ppm (by volume).

Acceptance criteria: After the tests, the base metal of specimens shall not exhibit any visual corrosive deterioration when inspected with normal or corrected vision without magnification.

ITE ID	Testing start date	Testing finish date	Compliance
ME-ITE-160896/04	21-10-2016	05-11-2016	YES
ME-ITE-160896/05	21-10-2016	16-11-2016	YES
ME-ITE-160896/06	21-10-2016	05-11-2016	YES

NOTE: NO in compliance means: The sample shows signs of corrosion
YES in compliance means: The sample doesn´t show signs of corrosion

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Marking test (Part 5.5 IEC 62561-2:2012)

Test performed rubbing manually for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked in solvent/mineral solvent.

Acceptance criteria: After the test, the marking shall be legible.

ITE ID	Testing date	Marking type	Compliance
ME-ITE-160896/04	12-12-2016	Sticker	YES
ME-ITE-160896/05	12-12-2016	Sticker	YES
ME-ITE-160896/06	12-12-2016	Sticker	YES

NOTE: The information included in the marking is: its identification number, its product name and the manufacturer company.

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Electrical Test (Part 5.4.3. IEC 62561-2:2012)

After the conditioning in the environmental tests each sample shall be subjected to an electrical test as per 6.3 of IEC 62561-1.

Air terminal class: H → 100 kA @ 10/350 µs (3 shots)

100 kA @ 10/350 µs Tolerances check:

- Ipeak (100 kA ± 10%)
- Charge, Q (50 A.s ± 20%)
- W/R (2500 kJ/W ± 35%)

ITE ID	Testing date	Shot	Ipeak (kA)	Q (A.s)	W/R (kJ/Ω)	Tolerances check	Visual inspection	Compliance
ME-ITE-160896/04	02/12/2016	1	97,961	46,9	2082	OK	OK	YES
		2	97,961	41,2	1650	OK		
		3	98,837	50,4	2250	OK		
ME-ITE-160896/05	02/12/2016	1	97,368	48,6	2183	OK	OK	YES
		2	97,93	43,4	1861	OK		
		3	97,836	44,2	1817	OK		
ME-ITE-160896/06	02/12/2016	1	98,555	49,8	2205	OK	OK	YES
		2	99,305	46,1	1984	OK		
		3	99,212	49,3	2208	OK		

Acceptance criteria:

The specimens are deemed to have passed the tests if:

a) The joints are not broken or do not show any crack to normal or corrected vision without magnification

b) The contact resistance measured with a source of at least 10 A, as close as possible to the joint is equal or less than 1 mΩ, but in the case of stainless steel equal or less than 2,5 mΩ

c) The specimen assembly still remains intact.

Clauses b and c are not applicable to air terminals because they do not contain any joints (two or more parts).

Finally the sample shall then be subjected to a mechanical tensile force of 1000 N (+/-10 N).

ITE ID	Testing date	Mechanical requirements	Compliance
ME-ITE-160896/04	05-12-2016	1000 N, 1 min	YES
ME-ITE-160896/05	05-12-2016	1000 N, 1 min	YES
ME-ITE-160896/06	05-12-2016	1000 N, 1 min	YES

Environmental conditions:

	Testing date	Temperature (ºC)	Relative Humidity (%)	Pressure (mbar)
Start	05-12-2016	19,26	58,7	1016,4
Finish	05-12-2016	19,4	60,3	1016,8

APPENDIX B. PHOTOGRAPHS

INSTITUTO TECNOLÓGICO DE LA ENERGÍA (ITE)
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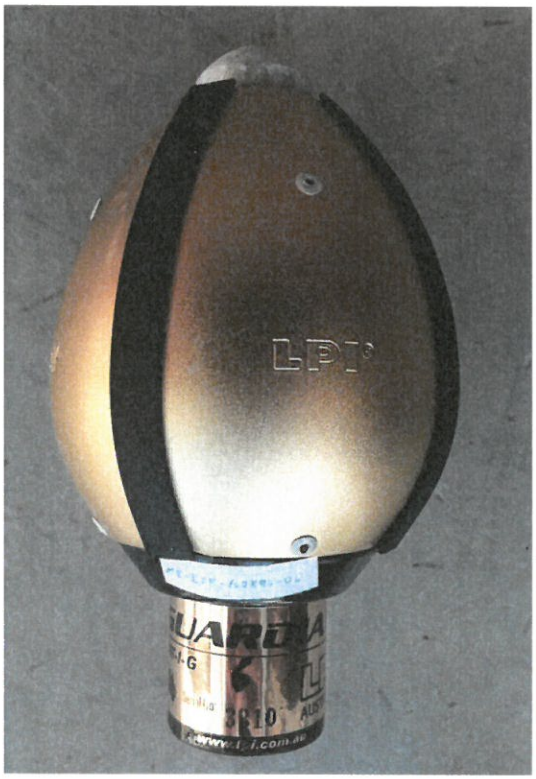

Figure 1. ME-ITE-160896/06 (GUARDIAN CAT-1-G)

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