

Document number | TA030\_TR\_02\_0

# Product test report


## TA030 to IEC 62561-2: 2012



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## 1 Revision Record

Rev	Description	Prep.	Check'd	App'd	Date
0	Original issue.	A.P.M.	A.P.M.		30/07/2014

## 2 Introduction

This report details the testing of the Furse component TA030; 25mm x 3 mm bare aluminium tape in accordance with IEC 62561-2:2012 Lightning Protection System Components (LPSC) – Part 2: Requirements for conductors and earth electrodes.

### 2.1 Declaration

The above product supplied by Furse has been successfully tested in accordance with IEC 62561-2:2012 Lightning Protection System Components (LPSC) – Part 2: Requirements for conductors and earth electrodes.


Therefore this component is declared appropriate for use in a lightning protection system (LPS) in line with the scope below.

### 2.2 Scope of Conformity

For use in a lightning protection system (LPS) for use as an air-termination conductor or down conductor in accordance with Furse literature.

## 3 Variant Part Numbers

Valid for variant part numbers TA105, TA110, TA115, TA120, TA125, TA130.

	Document: Product Test Report Furse TA030 to IEC 62561-2:2012	Doc No: TA030_TR_02	
		Rev: 0	Date: 30/07/2014

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**RESEARCH CENTRE FOR TESTS AND DEVELOPMENT  
SURGE CURRENT  
AND HIGH VOLTAGE LABORATORY**

**ELEMKO SA**

**TEST REPORT No. 31334**

**OF 25x3 mm ALUMINIUM SOLID TAPE CONDUCTOR  
FOR USE IN EXTERNAL LIGHTNING PROTECTION SYSTEMS (LPS)  
AS AIR TERMINATION CONDUCTOR AND DOWN CONDUCTOR**

**COMPANY :**



**PART NUMBER : TA030**

**APPLICABLE STANDARD:  
IEC / BS EN 62561-2:2012**



<http://www.a2la.org/scopepdf/3051-01.pdf>

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## ABBREVIATIONS

IEC : International Electrotechnical Commission  
ISO : International Standardization Organization  
EN : European Norm  
A2LA : American Association for Laboratory Accreditation

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## 1. (7.1) GENERAL

For the purpose of the easier assimilation of this report by the reader and for the better and the complete presentation of the test data, which is required by the standard IEC / BS EN 62561-2:2012, the format of the headings kept the same as it is mentioned in clause 7 of the above standard.

For the better comparison and completeness of this report with the standard's requirements, the corresponding numbering of the standard is also mentioned in each clause, in brackets.

## 2 (7.2) REPORT IDENTIFICATION

### 2.1 (7.2.a) Subject of the report

Description and results presentation of laboratory type testing according to IEC / BS EN 62561-2:2012 on aluminium solid tape conductor, provided by FURSE (THOMAS & BETTS) with part number TA030.

### 2.2 (7.2.b) Name, address and telephone number of the test laboratory

Research Development and Testing Centre – High Voltage and High Current Testing laboratory  
ELEMKO SA  
2<sup>nd</sup> km Thiva-Chalkida Old National Road, GR 32200, THIVA  
Tel: (+30) 2262024523 - 2262024574,  
Fax : (+30) 2262023571  
e-mail: [elemko@elemko.gr](mailto:elemko@elemko.gr)

### 2.3 (7.2.c) Name, address and telephone number of the sub contracting test laboratory

Tensile strength and elongation tests were subcontracted by accredited laboratory (ESYD issue nr. 159-4):

T.C.L Co - Test & Control Laboratories  
Head office : 116 Agias Eleousis Str., 151 25 Amarousion, Athens, Greece  
Tel: (+30) 2105579375,  
Fax : (+30) 2105579376  
e-mail: [info@ad-ndt.gr](mailto:info@ad-ndt.gr)

**2.4 (7.2.d) Number of test report** **31334**

### 2.5 (7.2.e) Applicant's name and address

**Request number:** 176  
**Name:** W. J. FURSE Ltd (THOMAS & BETTS)  
**Address:** Wilford Road, Nottingham NG2 1EB,  
United Kingdom

**2.6 (7.2.f) Total number of pages** 12

**2.7 (7.1.g) Date of issue of report** 2014/04/16

### 2.8 (7.1.h) Dates of performance the tests

**Initiation date:** 2014/03/13

**Closing date:** 2014/04/02

**2.9 (7.1.i) Authorized person to sign for the testing laboratory for the content of the report****Dr N. KOKKINOS**

Electrical Engineer Beng, MSc, PhD  
Laboratory Technical Manager

**2.10 (7.1.j) The tests were conducted by****L. KATSIKOIANNIS**

Electrical Engineer  
Test engineer

**S. MARKOU**

Laboratory Technician

**3. (7.3) SPECIMEN DESCRIPTION****3.1 (7.3.a) Specimen description**

Aluminium solid tape conductor, 25x3 mm nominal dimensions.

**3.2 (7.3.b) Description and identification of the test specimen and /or test assembly**

Three specimens of aluminium solid tape conductor 25x3 mm cut to a length of approx. 1200 mm with identification numbers 31334 A, 31334 B & 31334 C.

**3.3 (7.3.c) Characterization and condition of the test specimen and/or test assembly**

The received conductor were new and in good condition.

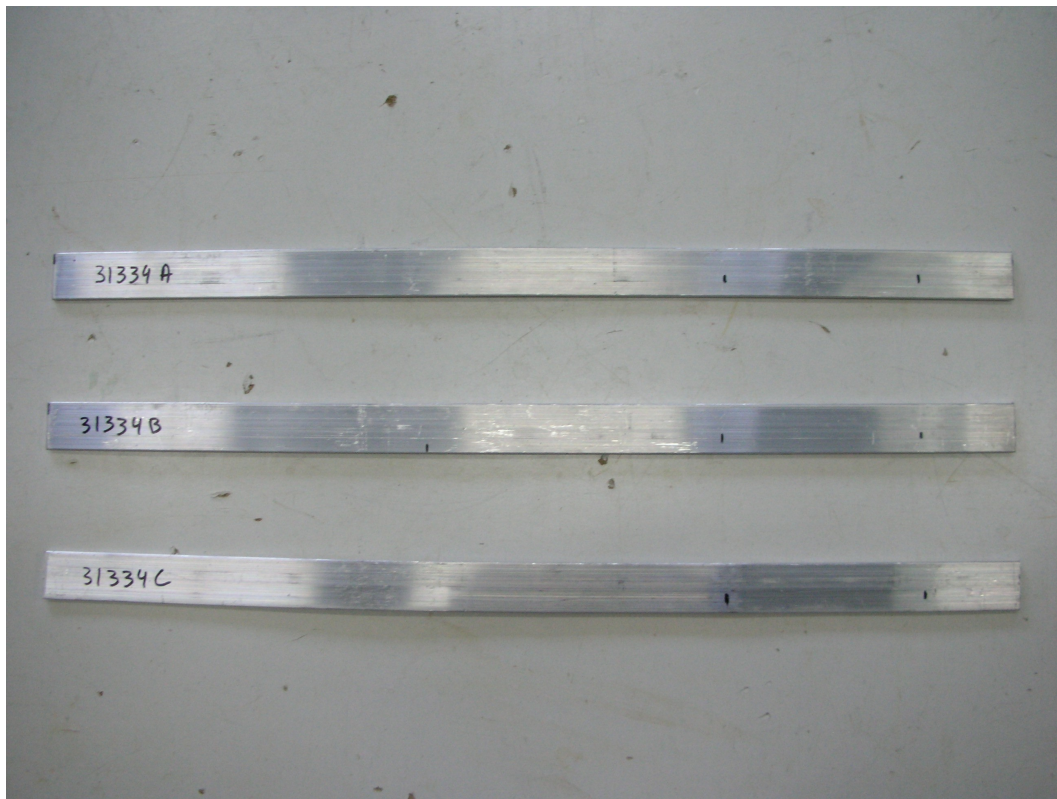
**3.4 (7.3.d) Sampling procedure**

Not relevant.

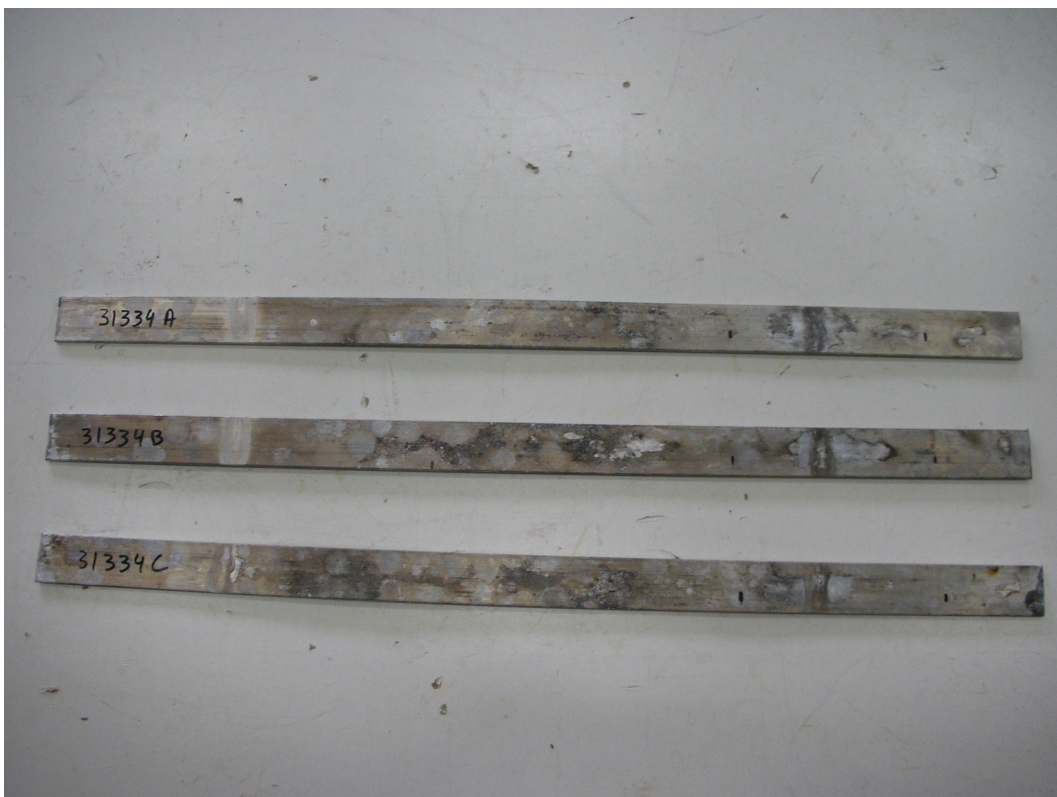
**3.5 (7.3.e) Date of receipt of test items:**

2014/03/06



**3.6 (7.3.f) Photographs**

1. Photograph of first set of specimens before the test sequence



2. Photograph of first set of specimens after the environmental test



3. Photograph of second set of specimens after the tensile test

## **4. (7.4) CONDUCTOR – ROD – PLATE**

### **4.1 (7.4.a) Material**

Aluminium.

### **4.2 (7.4.b) Nominal cross-section area, dimensions and shape**

Declared by the applicant 75 mm<sup>2</sup>, 25x3 mm solid tape conductor. For actual dimensions see Table of clause 9.

## **5. (7.5) STANDARDS AND REFERENCES**

### **5.1 (7.5.a) Test standard used**

IEC / BS EN 62561-2:2012

“Lightning protection system components (LPSC) – Part 2: Requirements for conductors and earth electrodes”.

### **5.2 (7.5.b) Other relevant documentation**

- IEC EN 62561-1:2012 “Lightning protection system components (LPSC) – Part 1: Requirements for connection components”.
- IEC EN 62305-3 “Protection against lightning – Part 3: Physical damage to structures and life hazards”.
- IEC EN 62305-4 “Protection against lightning – Part 4: Electrical and electronic systems within structures” (IEC 62305-4).
- Furse, Thomas & Betts, Total Soluttion Product Catalogue, as downloaded from the website of Thomas & Betts, [www.tnb.com](http://www.tnb.com) in March 2014.

## **6. (7.6) TEST PROCEDURE**

### **6.1 (7.6.a) Description of test procedure**

According to IEC / BS EN 62561-2:2012 the following tests were performed:

- Inspection on installation instructions literature provided by applicant as per clause 4.2 of the standard.
- Material, configuration, minimum dimensions as per clause 4.3 and Table 1 of the standard.
- Environmental test as per clause 5.2.4, of the standard.
- Tensile test as per clause 5.2.5 and Table 2 of the standard.
- Electrical resistivity test as per clause 5.2.6 and Table 2 of the standard.

For each test 3 specimens were used.

Before beginning of tests all specimens were cleaned by using a suitable degreasing agent and each one was marked for identification.

The tests were performed according the standard IEC / BS EN 62561-2:2012. Requirements and results are illustrated in detail in clause 9 “Table of results and parameters recorded” of the present report.



## **6.2 (7.6.b) Justification for any deviations from, additions to or exclusions from the referenced standard**

There were no deviations from, additions to or exclusions from the referenced standard.

## **6.3 (7.6.c) Other information relevant to the tests**

All information is tabled in clause 9 of this report.

## **6.4 (7.6.d) Configuration of the testing assembly**

See photo 1 in clause 3.6 of this report.

## **6.5 (7.6.e) Location of the arrangement in the testing area and measuring techniques**

Environmental – Electrical tests were performed in our laboratory's "conditioning test room".

Mechanical tests (tensile) in subcontractor's test room.

Measuring techniques used are illustrated in detail in clause 9 "Table of results and parameters recorded" of the present report.

## **7. (7.7) TESTING EQUIPMENT DESCRIPTION**

1. Environmental chamber for salt mist ageing and humid sulphurous atmosphere ageing, serial nr. 4077.
2. Elongation and tensile strength machine.



Photograph of the environmental ageing chamber used for salt mist ageing.

## 8. (7.8) MEASURING INSTRUMENTS DESCRIPTION

Instrument	Calibration date	Calibration interval
1. Digital micro-ohmmeter, 5 $\mu\Omega$ -400 $\Omega$ , serial nr. 166423.	2013/05/30	1 year
2. Digital sliding callipers (thickness gauge), 0-150 $\pm$ 0.01mm serial nr. 1U206306.	2013/08/19	1 year
3. Digital balance, 4,200 $\pm$ 0.01gr, serial nr. 077780190.	2013/11/05	1 year
4. 1m rule	2013/09/30 (internal)	1 year
5. Temperature and humidity meter, serial nr. 0004036360	2013/07/18	1 year

## 9. (7.9) RESULTS AND PARAMETERS RECORDED

The performed tests, required for aluminium solid tape conductors and their results are shown in the below table :

Table or clause	Requirements and passing criteria for aluminium solid tape conductors according to IEC / BS EN 62561-2:2012	Recorded results and parameters	PASS/ FAIL
4.2	<u>Documentation:</u> Adequate information to ensure that the installer can select and install in suitable and safe manner in accordance to EN 62305-3.	<u>Documentation:</u> The information is ensuring that the selection of the tested specimens and its installation can be performed in a suitable and safe manner.	PASS
4.3 Table 1	<u>Material:</u> - copper or; - tin plated copper or; - <b>aluminium</b> or; - copper coated aluminium or; - aluminium alloy or; - steel (galvanized or copper coated) or; - stainless steel.	<u>Material:</u> Aluminium	PASS
4.3 Table 1	<u>Configuration:</u> - <b>solid tape</b> or; - stranded or; - solid round.	<u>Configuration:</u> Solid tape	PASS
4.3 Table 1	<u>Cross sectional area for aluminium solid tape conductors:</u> <b><math>\geq 70 \text{ mm}^2</math></b> (allowable tolerance -3%)	<u>Cross sectional area:</u> 31334 A : 74,27 mm <sup>2</sup> 31334 B : 74,93 mm <sup>2</sup> 31334 C : 74,73 mm <sup>2</sup>	PASS
4.3 Table 1	<u>Recommended thickness for aluminium solid tape conductors:</u> <b>3 mm</b> (allowable tolerance -3%)	<u>Thickness:</u> 31334 A : 2,98 mm 31334 B : 3,02 mm 31334 C : 3,00 mm	PASS
5.2.2	<u>Visual inspection of zinc coating:</u>	<u>Visual inspection of coating:</u> NOT APPLICABLE	-
5.2.2	<u>Test for thickness coating:</u>	<u>Test for thickness coating:</u> NOT APPLICABLE	-


Table or clause	Requirements and passing criteria for aluminium solid tape conductors according to IEC / BS EN 62561-2:2012	Recorded results and parameters	PASS/ FAIL																
5.2.3	Bend test for coated conductors:	Bend test for coated conductors: NOT APPLICABLE	-																
5.2.4	<p><u>Environmental test:</u> The specimens must be subjected to a salt mist ageing test (3 days) followed by a humid sulphurous atmosphere test (7 days). Salt mist test is performed according to standard EN 60068-2-52:1996 (except clauses 7, 10 and 11 which are not applicable) Test is carried out using severity (2). Humid sulphurous atmosphere treatment is performed according to standard EN ISO 6988:1994 (except clauses 9 and 10 which are not applicable) with seven cycles with a concentration of sulphur dioxide of (667±25) ppm (in volume). Each cycle which has a duration of 24h is composed of a heating period of 8h at a temperature of (40±3)°C in the humid saturated atmosphere which is followed by a rest period of 16h. After that, the humid sulphurous atmosphere is replaced.</p> <p>After the test, the specimens shall satisfy the following criteria :</p> <ul style="list-style-type: none"> <li>- the base metal shall not exhibit any visual corrosive deterioration;</li> <li>- the electrical resistance over a 100mm length measured after the tests shall not exceed the resistance value measured before the tests by more than 50%.</li> </ul>	<p><u>Environmental test:</u> The specimens were subjected to the tests as follows:</p> <ul style="list-style-type: none"> <li>- Salt mist ageing test: 2014/03/21-2004/03/24</li> <li>- Humid sulphurous atmosphere test: 2014/03/24-2014/03/31</li> </ul> <p>After the test:</p> <ul style="list-style-type: none"> <li>- the base metal of the specimens did not exhibit any visual corrosive deterioration.</li> <li>- electrical resistance</li> </ul> <table border="1"> <thead> <tr> <th>Specimen</th><th>Rbefore (μΩ)</th><th>Rafter (μΩ)</th><th>Difference %</th></tr> </thead> <tbody> <tr> <td>31334 A</td><td>43</td><td>41</td><td>-5</td></tr> <tr> <td>31334 B</td><td>55</td><td>45</td><td>-18</td></tr> <tr> <td>31334 C</td><td>48</td><td>45</td><td>-6</td></tr> </tbody> </table>	Specimen	Rbefore (μΩ)	Rafter (μΩ)	Difference %	31334 A	43	41	-5	31334 B	55	45	-18	31334 C	48	45	-6	<p>PASS</p> <p>PASS</p>
Specimen	Rbefore (μΩ)	Rafter (μΩ)	Difference %																
31334 A	43	41	-5																
31334 B	55	45	-18																
31334 C	48	45	-6																
5.2.5 Table 2	<p><u>Tensile strength test:</u> Tensile strength for aluminium: <b>≤150 N/mm²</b></p> <p>Measuring technique: Tensile strength test should be performed according to standard ISO 6892-1. The specimens should be tested un-machined as per D.1.</p>	<p><u>Tensile strength test:</u> The tests were performed according to standard EN 10002–01 and the specimens were tested un-machined.</p> <p>Tensile strength: 31334 A : 78,82 N/mm² 31334 B : 77,93 N/mm² 31334 C : 78,55 N/mm²</p>	PASS																
5.2.6 Table 2	<p><u>Electrical resistivity test:</u> Maximum electrical resistivity for aluminium: <b>0,03 μΩm</b></p> <p>Measuring technique: A sample length approximately 1,2 m should be used for the test. The resistance (R) measurement should be taken over a 1000±1 mm distance, using proprietary microohmmeter and the reading corrected to 20 °C using appropriate correction factors. The sample should then be weighted. The resistivity of the sample length can then be found by the formula:</p> $(\rho)=Rx\frac{A}{l}$ <p>Where: R = Resistance in microohms (μΩ) over 1m length. A = Cross sectional area (m²) ℓ = Unit length (m)</p>	<p><u>Electrical resistivity test:</u> Electrical resistivity: 31334 A : 0,027 μΩm 31334 B : 0,027 μΩm 31334 C : 0,027 μΩm Temperature during electrical resistivity measurements: 31334 A : 24,9 °C 31334 B : 24,9 °C 31334 C : 24,9 °C</p>	PASS																

Table or clause	Requirements and passing criteria for aluminium solid tape conductors according to IEC / BS EN 62561-2:2012	Recorded results and parameters	PASS/FAIL
4.5 5.5	<p><u>Marking test</u></p> <p>The specimens shall be marked with:</p> <ul style="list-style-type: none"> <li>- the manufacturer's or responsible vendor's name, logo or trademark;</li> <li>- identifying symbol.</li> </ul> <p>The marking is checked by inspection and by rubbing it by hand for 15 sec, with a piece of cloth soaked in water and again for 15 sec with a piece of cloth soaked with white spirit/mineral spirit.</p> <p>The specimens are deemed to have passed the test if the marking remains legible.</p> <p>Note 1: Where marking proves to be impractical, it may be given on the smallest packing unit.</p> <p>Note 2: Marking made by moulding, pressing or engraving is not subjected to this test.</p>	<p><u>Marking test:</u></p> <p>The product identification is given on the smallest packing unit.</p>	PASS

## 10. (7.10) SUMMARY STATEMENT

Three specimens of aluminium solid tape conductor nominal dimensions 25x3 mm, part number TA030, were submitted for testing by FURSE (THOMAS & BETTS) and have been subjected to all the applicable tests required by Standard IEC / BS EN 62561-2:2012, which are mentioned in the clauses 4.2, 4.3, 4.5, 5.2.4, 5.2.5, 5.2.6, 5.5 and Tables 1 & 2 of the standard and found that :

The above three specimens have successfully passed the tests and therefore they satisfy the criteria according to IEC / BS EN 62561-2:2012 for use in external Lightning Protection Systems (LPS) as air termination conductor and down conductor.

	Laboratory Technical Director
NAME	Dr. N. Kokkinos Electrical Engineer BEng, MSc, PhD
SIGNATURE	 <b>ELEMKO S.A.</b> R. & D. Testing Lab. THIVA - GREECE TEL: +30 210 2845400 e-mail: elemko@elemko.gr

NOTE: This report only explains the specimens submitted for test and does not produce evidence for the quality for standard fabrication.

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