




Product Test Report

CP205 to IEC 62561-4: 2010

1 Revision Record

Rev	Description	Prep.	Check'd	App'd	Date
0	Original issue.	A.P.M.	A.P.M.		3/13/2013

2 Introduction

This report details the testing of the Furse component CP205; DC clip to suit 20 mm x 3 mm bare copper in accordance with IEC 62561-4:2010 Lightning Protection System Components (LPSC) – Part 4: Requirements for conductor fasteners.

2.1 Declaration


The above product supplied by Furse has been has been sucessfully tested in accordance with IEC 62561-4:2010 Lightning Protection System Components (LPSC) – Part 4: Requirements for conductor fasteners.

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 the fixing/fastening of copper tape in accordance with Furse literature.

3 Variant Part Numbers

	Document: Product Test Report Furse CP205 to IEC 62561-4:2010	Doc No: CP205_TR_01	
		Rev: 0	Date: 3/13/2013

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

TEST REPORT

**OF METALLIC (COPPER ALLOY) FASTENER WITH SCREWS
DESIGNED TO CLAMP THE CONDUCTOR
FOR FASTENING IN LIGHTNING PROTECTION SYSTEMS
20x3 mm TAPE CONDUCTOR**

**COMPANY : W. J. FURSE & Co Ltd
PART NUMBER : CP205**

REPORT NUMBER: 31203

**APPLICABLE STANDARD:
IEC/BS EN 62561-4:2011**



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

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ABBREVIATIONS

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

1. (8.1) Structure and content of the test report

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 62561-4, the format of the headings kept the same as it is mentioned in clause 8 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. (8.2) Report identification

2.1 (8.2.1) Subject / Title

Description and results presentation of laboratory type testing according to IEC/BS EN 62561-4 on fastener provided by W. J. Furse & Co Ltd with part number CP205.

2.2 (8.2.2) Name, address and telephone number of the test laboratory

Research Development and Testing Centre – High Voltage and High Current Testing laboratory
ELEMKO SA

2nd km Thiva-Chalkida Old National Road, GR 32200, THIVA

Tel: (+30) 2262024523 - 2262024574,

Fax : (+30) 2262023571

e-mail: elemko@elemko.gr

2.3 (8.2.3) Name, address and telephone number of the sub contracting test laboratory

There were no tests subcontracted by other laboratory.

2.4 (8.2.4) Number of test report **31203**

2.5 (8.2.5) Applicant's name and address

Request number:	146
Name:	W. J. FURSE & Co Ltd
Address:	Wilford Road, Nottingham NG2 1EB, United Kingdom

2.6 (8.2.6) Total number of pages **14**

2.7 (8.2.7) Date of issue of report **2013/02/07**

2.8 (8.2.8) Dates of performance the tests

Initiation date: 2013/01/08	Closing date: 2013/02/06
------------------------------------	---------------------------------

2.9 (8.2.9) 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 (8.2.10) The tests were conducted by**L. KATSIKOIANNIS**

Electrical Engineer

Test engineer

S. MARKOU

Laboratory Technician

2.11 (8.2.11) Declaration to avoid misuse

This type test report may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. This type test report only covers the specimens submitted for test and does not produce evidence for the quality for series production.

3. (8.3) Specimen description**3.1 (8.3.1) Specimen description**

Metallic (copper alloy) fastener with screws designed to clamp the conductor, for fastening tape conductor.

3.2 (8.3.2) Functional parts and accessories description

The fastener is consisted of a base of elliptic shape of dimensions 44x18x8 mm, 44x18x5,5 mm approx., formed to receive a conductor of tape shape, a cover of elliptic shape of dimensions 58x20x3,5mm approx. and two slotted countersunk head screws M6x12 mm (see photo 1 in clause 4.3 of the report).

3.3 (8.3.3) Manufacturing method

Forged, as per applicant declaration.

3.4 (8.3.4) Detailed description and unambiguous identification of the test specimen and/or test assembly

Twelve fasteners mounted rigidly by two on insulating plates and assembled to six arrangements (see photos 2a, 2b, clause 4.3 of the report), using stainless steel (SS) solid tape conductor 20x3 mm (a first set of three arrangements intended for the lateral load test) and copper (Cu) solid tape conductor 20x3 mm (a second set of three arrangements intended for the axial load test). For traceability:

a) The arrangements intended for the lateral load test were given the identification numbers 31203 A1-2 31203 A3-4 and 31203 A5-6 (the numbers 1-2, 3-4 & 5-6 stands for the arrangements' fasteners).

b) The arrangements intended for the axial load test were given the identification numbers 31203 B1-2, 31203 B3-4 and 31203 B5-6 (the numbers 1-2, 3-4 & 5-6 stands for the arrangements' fasteners).

4. (8.4) Characterization and condition of the test specimen and assembly

The received specimens and conductors were new and in good condition.

4.1 (8.4.1) Sampling procedure

Not relevant.

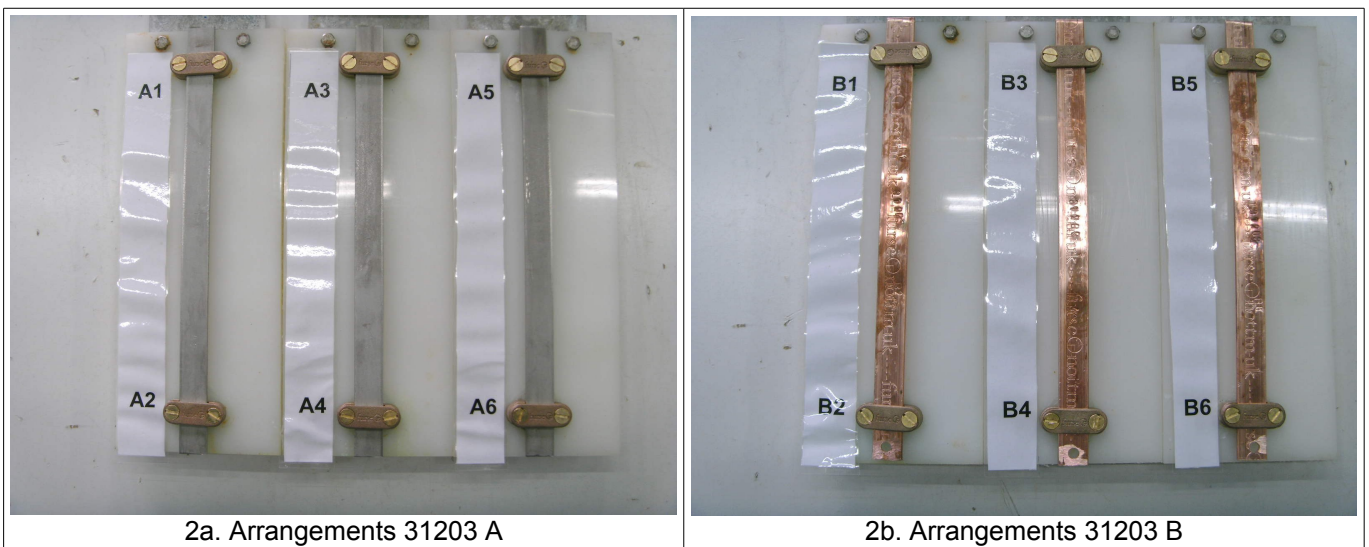
4.2 (8.4.2) Date of receipt of test specimens

2013/01/08

4.3 (8.4.3) Photographs



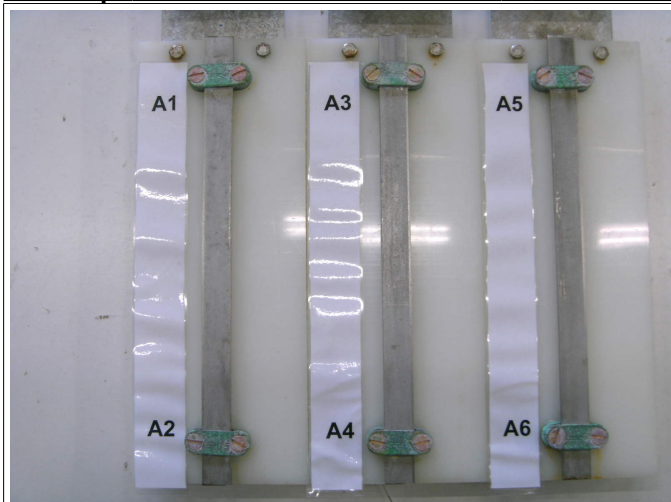
1. Photographs of the fastener



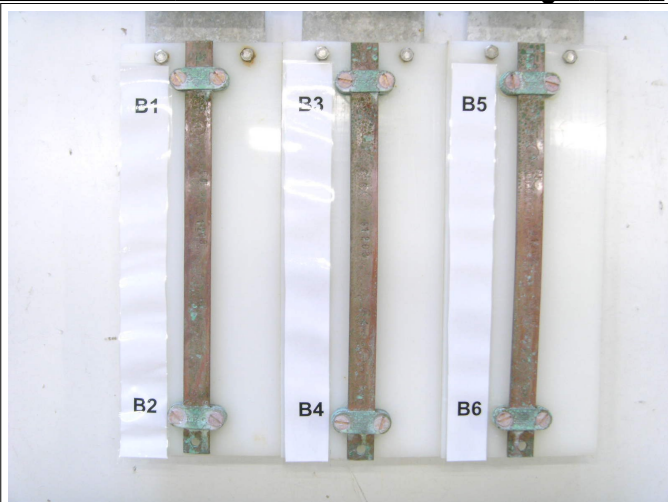
2a. Arrangements 31203 A

2b. Arrangements 31203 B

2. The assembled specimens before the initiation of the test sequence

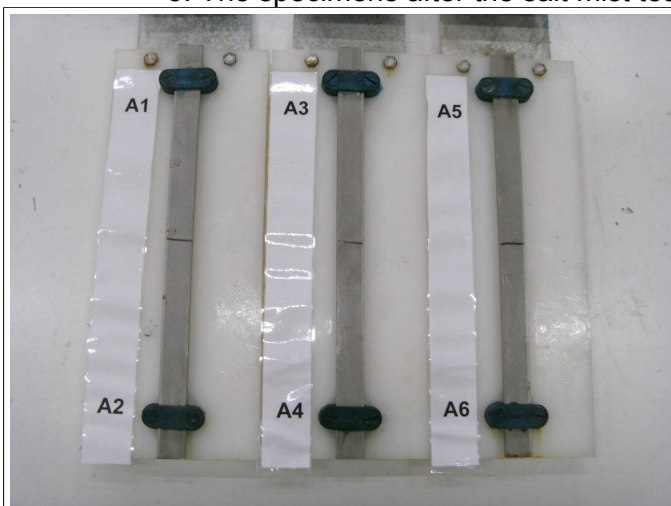


3a. Arrangements 31203 A

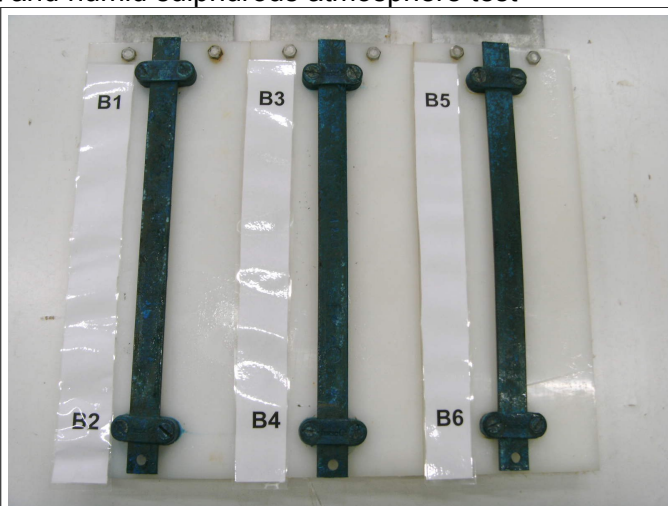


3b. Arrangements 31203 B

3. The specimens after the salt mist test and humid sulphurous atmosphere test

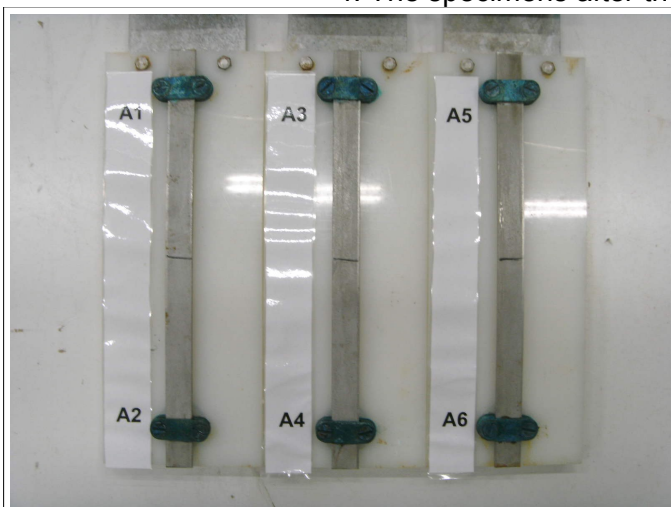


4a. Arrangements 31203 A



4b. Arrangements 31203 B

4. The specimens after the ammonia atmosphere test



5a. Arrangements 31203 A



5b. Arrangements 31203 B

5. The specimens after the termination of the tests.

5. (8.5) Conductor

5.1 (8.5.1) Conductor material

Specimens with "A" identification: Stainless steel (SS)

Specimens with "B" identification: Copper (Cu).

5.2 (8.5.2) Nominal cross-section area, dimensions and shape

60mm² nominal cross section area, 20x3 mm, solid rectangular tape.

6. (8.6) Standards and references

6.1 (8.6.1) Test standard used

BS EN 62561-4:2011

"Lightning protection system components (LPSC) – Part 4: Requirements for conductor fasteners"
(IEC 62561-4:2010, modified).

6.2 (8.6.2) Reference to the above standard

Reference to the above standard can be made because the specimens subjected to the full set of the required tests, which are reported in clause 10.

6.3 (8.6.3) Other relevant documentation

- EN 62305-3 "Protection against lightning – Part 3: Physical damage to structures and life hazards" (IEC 62305-3, mod.).
- Furse, Thomas & Betts, Total Sollution Product Catalogue, as downloaded from the website of Thomas & Betts, www.tnb.com in January 2013.

7. (8.7) Test procedure

7.1 (8.7.1) Description of the test procedure

According to IEC/BS EN 62561-4 the following tests were performed:

- Environmental influence test as per clause 6.3 of the standard.
- Resistance to mechanical effects as per clause 6.4 of the standard.
- Inspection on installation instructions literature as per clause 6.5 of the standard.
- Marking test as per clause 6.6 of the standard.
- Inspection on construction as per clause 6.7 of the standard.

Before beginning of tests all specimens were cleaned by using a suitable degreasing agent and the arrangements were marked by engraving for identification.

The specimens were assembled by two on insulating plates, using stainless steel (SS) solid tape conductor 20x3 mm (arrangements intended for the lateral load test) and copper solid tape conductor 20x3 mm (arrangements intended for the axial load test). The screws of the specimens were tightened with a torque wrench. The tightening torque given by the applicant was 5 Nm.

The tests were performed according the standard IEC/BS EN 62561-4. Requirements and results are illustrated in detail in clause 10 "Results and parameters recorded" of the present report.

7.2 (8.7.2) 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.

7.3 (8.7.3) Other informations relevant to the tests

All information is tabled in clause 10 of this report.

7.4 (8.7.4) Configuration of the testing assembly

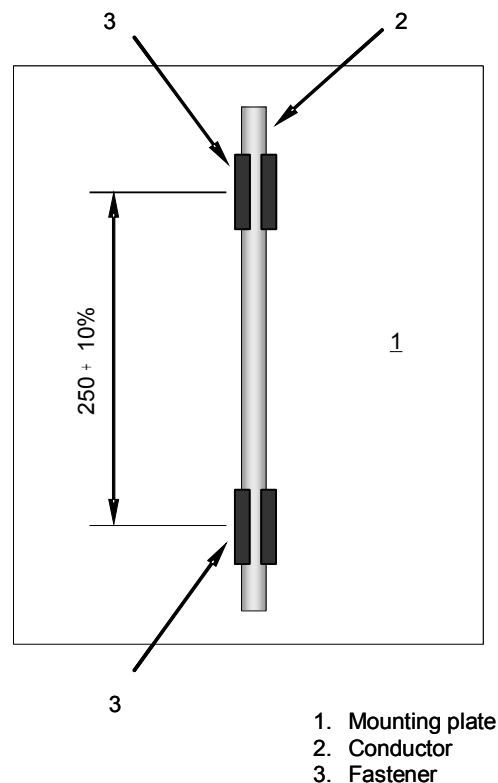


Figure 1 : Configuration of the testing assembly

7.5 (8.7.5) Location of the arrangement in the testing area

The tests were performed in our laboratory's "conditioning test room".

8. (8.8) Testing equipment description

1. Environmental ageing chamber, serial nr. 4077.
2. Ammonia ageing chamber.
3. Cooling – heating chamber, serial nr MX904–050110.
4. 15kg weights.
5. 5kg weights.



Photograph of the environmental ageing chamber used for salt mist and humid sulphurous atmosphere ageing.



Photograph of cooling – heating chamber

9. (8.9) Measuring instruments description

Instrument	Calibration date	Calibration interval
1. Electronic torque wrench, 0–6Nm, serial nr. 11058031.	2012/08/17	1 year
2. Digital sliding calipers (thickness gauge), 0-150 ±0.01mm, serial nr. 1U206306.	2012/08/17	1 year

10. (8.10) Results and parameters recorded**10.1 (8.10.1–8.10.2–8.10.3) Tables of results and parameters observed or derived, required passing criteria**

Requirements and passing criteria according to IEC/BS EN 62561-4:2011	Recorded results and parameters	PASS/FAIL
<p><u>Environmental influence test (see 6.3.1 of the standard)</u></p> <p>All the arrangements shall be subjected to the environmental tests in the following sequence:</p> <ul style="list-style-type: none"> • Salt mist treatment for 3 days, according to standard EN 60068-2-52:1996 (except for clauses 7, 10 and 11 which are not applicable). Test is carried out using severity (2). • Humid sulphurous atmosphere treatment according to standard EN ISO 6988:1994 (except for 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. • Ammonia atmosphere treatment for 1 day, according to standard ISO 6957:1988 for a moderate atmosphere with the pH value 10 except for 8.4 and Clause 9 which are not applicable. <p>The specimens are deemed to have passed the environmental influence tests if there are no signs of corrosive deterioration of the conductor or conductor fastener, visible to normal or corrected vision.</p> <p>NOTE: White rust is not considered as corrosive deterioration.</p>	<p><u>Environmental test:</u></p> <p>All the arrangements (31203 A1-2, 31203 A3-4, 31203 A5-6, 31203 B1-2, 31203 B3-4, 31203 B5-6) were subjected to the tests as follows:</p> <ul style="list-style-type: none"> - Salt mist ageing test: 2013/01/08 - 2013/01/11 - Humid sulphurous atmosphere test: 2013/01/11 - 2013/01/18 - Ammonia atmosphere test: 2013/01/31 - 2013/02/01 <p>After the tests non of the conductors or conductor fasteners exhibited any signs of corrosive deterioration visible to normal or corrected vision.</p>	PASS
<p><u>Resistance to mechanical effects, lateral load test at –10°C (see 6.4.1 of the standard)</u></p> <p>After the environmental tests a first set of three arrangements of specimens shall be subjected to a load test of 200N applied in the mid distance between the conductor fasteners. The full test load shall be applied for period of 5 min to 6 min. The test shall be carried out at the temperature of –10±1°C.</p> <p>The specimens are deemed to have passed the tests provided the fasteners remain intact and the conductor is still located within the fasteners.</p>	<p><u>Lateral load test at –10°C:</u></p> <p>The test was carried out on the arrangements 31203 A1-2, 31203 A3-4 & 31203 A5-6, at temperatures: –10,4°C ÷ –9,2°C for a period of 6 min.</p> <p>After the test all the fasteners remain intact and all the conductors were still located within the fasteners.</p>	PASS
<p><u>Resistance to mechanical effects, lateral load test at +40°C (see 6.4.1 of the standard)</u></p> <p>The same set of three arrangements of specimens shall be subjected to a second load test of 200N applied in the mid distance between the conductor fasteners. The second test shall be carried out at the temperature of +40±4°C and the full test load shall be applied for period of 5 min to 6 min.</p> <p>The specimens are deemed to have passed the tests provided the fasteners remain intact and the conductor is still located within the fasteners.</p>	<p><u>Lateral load test at +40°C:</u></p> <p>The test was carried out on the arrangements 31203 A1-2, 31203 A3-4 & 31203 A5-6, at temperatures: +39,1°C ÷ +40,1°C for a period of 6 min.</p> <p>After the test all the fasteners remain intact and all the conductors were still located within the fasteners.</p>	PASS

Requirements and passing criteria according to IEC/BS EN 62561-4:2011	Recorded results and parameters	PASS/ FAIL
<p><u>Resistance to mechanical effects, axial load test at -10°C (see 6.4.2 of the standard)</u></p> <p>After the environmental tests a second set of three arrangements of specimens shall be subjected to a load test of 50N applied along the conductor. The full test load shall be applied for period of 5 min to 6 min. All tests shall be carried out at the temperature of $-10\pm 1^{\circ}\text{C}$.</p> <p>The specimens are deemed to have passed the tests provided the fasteners remain intact and the displacement of the conductor with the respect to the fasteners is not more than 3mm.</p>	<p><u>Axial load test at -10°C:</u></p> <p>The test was carried out on the arrangements 31203 B1-2, 31203 B3-4 & 31203 B5-6, at temperatures: $-10,4^{\circ}\text{C} \div -9,2^{\circ}\text{C}$ for a period of 6 min.</p> <p>After the test all the fasteners remain intact and the displacement of the conductor with the respect to the fasteners, for each arrangement was: 31203 B1-2: 0,4 mm 31203 B3-4: 0,3 mm 31203 B5-6: 0,2 mm</p>	PASS
<p><u>Resistance to mechanical effects, axial load test at $+40^{\circ}\text{C}$ (see 6.4.2 of the standard)</u></p> <p>The same set of three arrangements of specimens shall be subjected to a second load test of 50N applied along the conductor. The second test shall be carried out at the temperature of $+40\pm 4^{\circ}\text{C}$ and the the full test load shall be applied for period of 5 min to 6 min.</p> <p>The specimens are deemed to have passed the tests provided the fasteners remain intact and the displacement of the conductor with the respect to the fasteners is not more than 3mm.</p>	<p><u>Axial load test at $+40^{\circ}\text{C}$:</u></p> <p>The test was carried out on the arrangements 31203 B1-2, 31203 B3-4 & 31203 B5-6, at temperatures: $+39,1^{\circ}\text{C} \div +40,1^{\circ}\text{C}$ for a period of 6 min.</p> <p>After the test all the fasteners remain intact and the displacement of the conductor with the respect to the fasteners, for each arrangement was: 31203 B1-2: 0,5 mm 31203 B3-4: 0,3 mm 31203 B5-6: 0,3 mm</p>	PASS
<p><u>Installation instructions (see 6.5 of the standard)</u></p> <p>The installation instructions must contain:</p> <ul style="list-style-type: none"> - The classifications; - The maximum and the minimum conductor dimensions; - Materials of conductors to be used; - The type of mounting surface to be fixed; - The recommended method of assembly, installation and fixing to the mounting surface; - The lateral load; - The axial movement load. 	<p><u>The installation instructions contains:</u></p> <ul style="list-style-type: none"> - The classifications; - The max and the min conductor dimensions; - Materials of conductors to be used; - The type of mounting surface to be fixed; - The recommended method of assembly, installation and fixing to the mounting surface; - The lateral load; - The axial movement load. 	PASS

Requirements and passing criteria according to IEC/BS EN 62561-4:2011	Recorded results and parameters	PASS/ FAIL
<p><u>Marking test (see 5.5 & 6.6 of the standard)</u></p> <p>Each conductor fastener shall be marked with:</p> <ul style="list-style-type: none"> - the manufacturer's or responsible vendor's name, logo or trademark; - the product identification or type. <p>Marking on the product shall be durable and easily legible.</p> <p>Compliance is checked by inspection and by rubbing the marking 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.</p> <p>The specimens are deemed to have passed the test if the marking remains legible.</p> <p>Note 1: Where it is not possible to make these marks directly onto the product, they shall be on the smallest supplied packaging.</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 marking was made by forged. Therefore only the visual inspection has been performed.</p> <p>Each fastener was marked with the manufacturer's name and trademark. The product identification is given on the smallest supplied packaging.</p>	PASS
<p><u>Construction (see 6.7 of the standard)</u></p> <p>The surface of the specimens shall be free from burrs from cutting process, flash, moulding, joint deformation and similar inconsistencies which are likely to damage the conductors or inflict injury to the installer or user.</p>	<p><u>Construction:</u></p> <p>The surface of the fasteners was free from burrs from cutting process, flash, moulding, joint deformation.</p>	PASS


10.2 (8.10.4) Summary statement

Twelve specimens of copper alloy fastener part number CP205, which are classified according to IEC/BS EN 62561-4 as:

- metallic as per subclause 4a;
- with screws as per subclause 4b;
- to clamp the conductor as per subclause 4c;

were submitted for testing by W. J. Furse & Co Ltd and have been subjected to all the applicable tests required by the Standard IEC/BS EN 62561-4:2011 which are mentioned in the clauses 6.3.1, 6.4.1, 6.4.2, 6.5, 6.6 & 6.7 of the standard and found that :

The above twelve specimens have successfully passed the tests and therefore they satisfy the criteria according to IEC/BS EN 62561-4:2011 for use in Lightning Protection Systems (LPS), for clamping tape conductor 20x3 mm dimensions.

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

NOTE: This type test report only covers the specimens submitted for test and does not produce evidence for the quality for series production.