

EARTHING & LIGHTNING PROTECTION

Furse CN810-FU

IEC 62561-1:2017 test report

Contents

1. Introduction	2
1.1. Declaration	2
1.2. Scope of conformity	2
1.3. Variant part numbers	2
2. Main report	2
3. Revisions	24
4. Notices	24
5. Trademarks	24

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1. Introduction

This report details the testing of the Furse component CN810-FU [7TCA083630R0008]; Bimetallic connector to suit 25 mm x 3 mm conductor in accordance with IEC 62561-1:2017 Lightning Protection System Components (LPSC) – Part 1: Requirements for connection components.

1.1. Declaration

The above product supplied by Furse has been successfully tested in accordance with IEC 62561-1:2017 Lightning Protection System Components (LPSC) – Part 1: Requirements for connection components.

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

1.2. Scope of conformity

For use in a lightning protection system (LPS) for the bi-metallic connection of Aluminium and Copper tape in accordance with Furse literature.

In an in line connection (B3).

For an impulse current withstand capability of 100kA (class H).

1.3. Variant part numbers

2. Main report

The body of the formal report follows.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
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**ELEMKO SA
LIGHTNING & HIGH VOLTAGE LABORATORY
THIVA GREECE**

TEST REPORT No. 32032

**OF BIMETALLIC CONNECTOR, PART NUMBER CN810-FU
IN "IN-LINE" CONNECTION ARRANGEMENT (B3)**

APPLICANT :

ABB FURSE



**APPLICABLE STANDARD:
IEC EN 62561-1:2017**



Certificate #3051.01

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

Table of Contents	
ABBREVIATIONS	3
1. (8) STRUCTURE AND CONTENT OF THE TEST REPORT	4
1.1. (8.1) GENERAL	4
1.2. (8.2) REPORT IDENTIFICATION	4
a) Subject of the report	4
b) Name, address and email or telephone number of the test laboratory	4
c) Name, address and email or telephone number of the sub test laboratory where the test was carried out if different from the company which has been assigned to perform the test	4
d) Unique identification number of the test report:	4
e) Applicant's name and address	4
f) Total number of pages:	4
g) Date of issue of report:	4
h) Dates of performance the tests:	4
i) Signature and title, or an equivalent identification of the person authorized to sign for the testing laboratory for the content of the report	5
j) The tests were conducted by	5
1.3. (8.3) SPECIMEN DESCRIPTION	5
a) Sample description	5
b) Detailed description and unambiguous identification of the test sample and/or assembly	5
c) Characterization and condition of the test sample and/or test assembly	5
d) Sampling procedure, where relevant	5
e) Date of receipt of test items :	5
f) Photographs, drawings or any other visual documentation, if available	6
1.4. (8.4) CONDUCTOR	8
a) Conductor material	8
b) Nominal cross-section area, dimensions and shape	8
1.5. (8.5) STANDARDS AND REFERENCES	8
a) Identification of the test standard used and the date of issue of the standard	8
b) Other relevant documentation with the documentation date	8
1.6. (8.6) TEST PROCEDURE	9
a) Description of the test procedure	9
b) Justification for any deviations from, additions to or exclusions from the referenced standard	9
c) Any other Information relevant to a specific test such as environmental conditions	9
d) Configuration of testing assembly	10
e) Location of the arrangement in the testing area and measuring techniques	10
1.7. (8.7) TESTING EQUIPMENT DESCRIPTION	10
1.8. (8.8) MEASURING INSTRUMENTS DESCRIPTION	11
1.9. (8.9) RESULTS AND PARAMETERS RECORDED	12
1.10. (8.10) STATEMENT OF PASS/FAIL	14
ANNEX A: TABLE OF STANDARD REQUIREMENTS COMBINED WITH	15
LABORATORY'S UNCERTAINTIES	15
ANNEX B: OSCILLOSCOPE RECORDINGS OF THE IMPULSE CURRENT TESTS	16
ANNEX C: SPECIMEN'S INSTALLATION INSTRUCTIONS	19

ABBREVIATIONS

IEC: International Electrotechnical Commission
ISO: International Standardization Organization
EN: European Norm
A2LA: American Association for Laboratory Accreditation
ILAC-MRA: International Laboratory Accreditation Cooperation - Mutual Recognition Arrangement

This type test report may not be reproduced, except in full, without the prior written approval of the issuing testing laboratory. In any case, changes such as tags, additions, deletions, alterations of information, etc, in the text of test report, are not permitted.

1. (8) STRUCTURE AND CONTENT OF THE TEST REPORT

1.1. (8.1) 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, the format of the headings kept the same as it is mentioned in clause 8 of the applicable 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.

1.2. (8.2) REPORT IDENTIFICATION

a) Subject of the report

Description and results presentation of laboratory type testing according to IEC EN 62561-1:2017 on connector provided by ABB FURSE with part number CN810-FU.

b) Name, address and email or telephone number of the test laboratory

ELEMKO SA, LIGHTNING & HIGH VOLTAGE LABORATORY, THIVA GREECE
2nd km Old National Road Thiva-Halkida GR 32200, Thiva, Greece
Tel: (0030) 2102845400
Fax : (0030) 2102840151
e-mail: elemko@elemko.gr

c) Name, address and email or telephone number of the sub test laboratory where the test was carried out if different from the company which has been assigned to perform the test

There were no tests subcontracted by other laboratory.

d) Unique identification number of the test report: 32032

e) Applicant's name and address

Name: ABB FURSE
Address: Wilford Road, Nottingham NG2 1EB
United Kingdom
Request number: 386

f) Total number of pages: 21

g) Date of issue of report: 2021/09/21

h) Dates of performance the tests:

Initiation date: 2021/08/27

Closing date: 2021/09/10

i) Signature and title, or an equivalent identification of the person authorized to sign for the testing laboratory for the content of the report

Dr. N. KOKKINOS

Electrical Engineer BEng, MSc, PhD, CEng
Laboratory Technical Manager

j) The tests were conducted by

L. KATSIKOIANNIS

Electrical Engineer
Test Engineer

S. MARKOU

Laboratory Technician

1.3. (8.3) SPECIMEN DESCRIPTION

a) Sample description

Connector of FURSE company, for connection of solid tape conductors. For details see installation instructions in ANNEX C.

b) Detailed description and unambiguous identification of the test sample and/or assembly

Each clamp was connected with copper solid tape conductor of 25x3 mm dimensions and aluminium solid tape conductor of 25x3 mm dimensions. For traceability, the specimens were marked with the identification numbers 32032 A, 32032 B & 32032 C.
Specimen configuration is illustrated in clause 1.3.f.

c) Characterization and condition of the test sample and/or test assembly

The received specimens were new and in good condition.

d) Sampling procedure, where relevant

Not relevant.

e) Date of receipt of test items : 2021/08/25

f) Photographs, drawings or any other visual documentation, if available

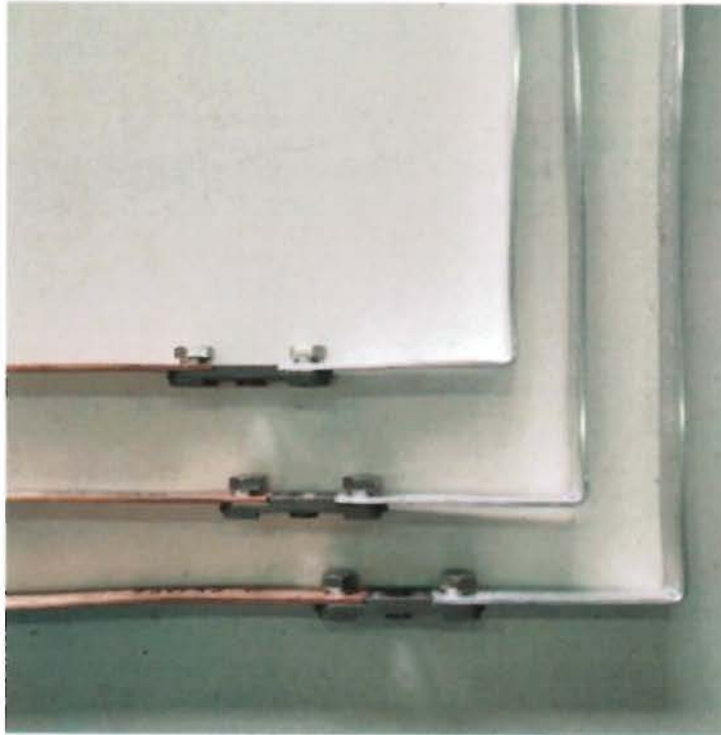


Figure f1. The assembled specimens before the initiation of the test sequence

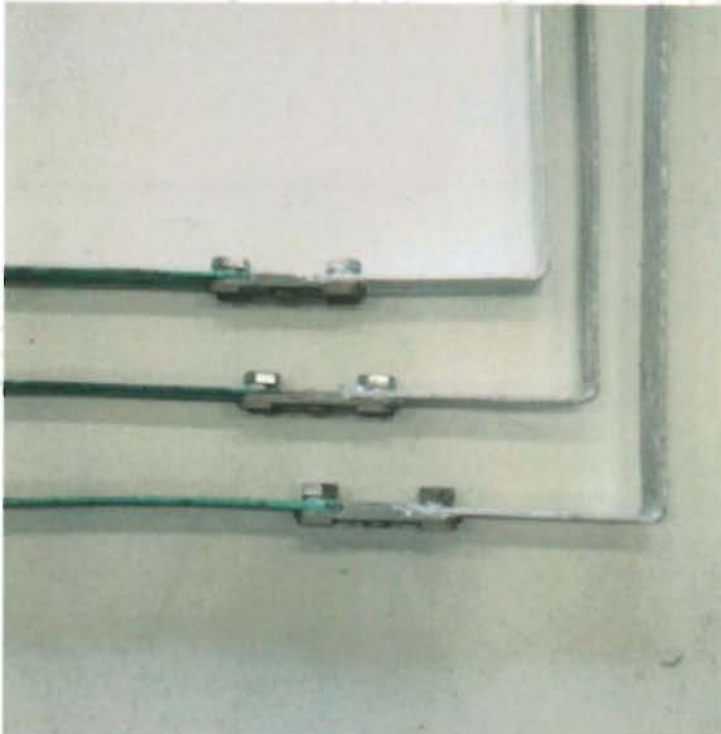


Figure f2. The specimens following the salt mist treatment and humid sulphurous atmosphere treatment tests

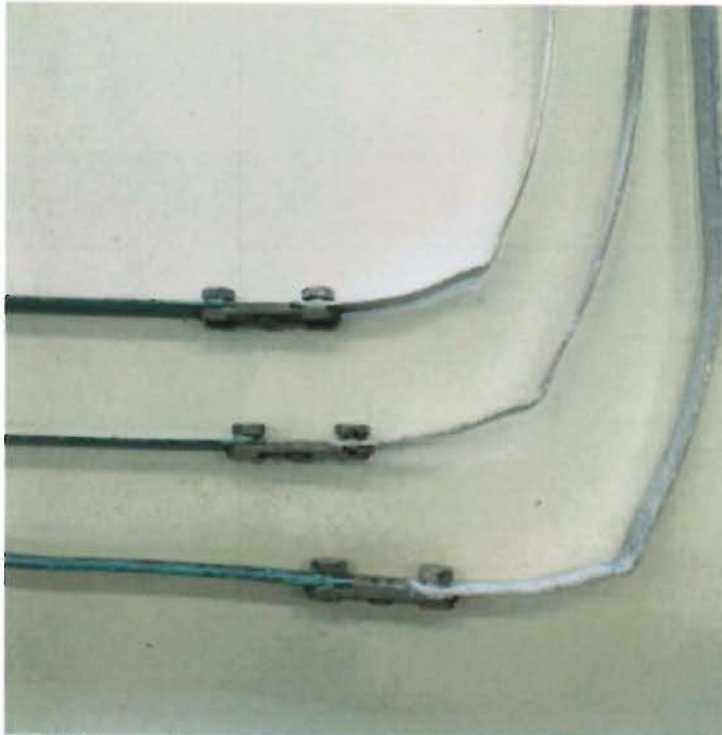


Figure f3. The specimens following the termination of the electrical tests.

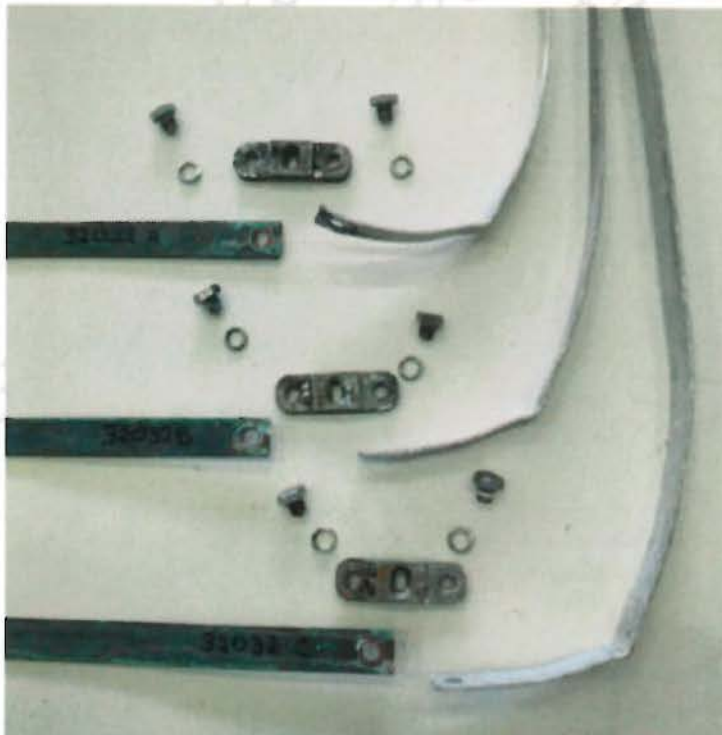


Figure f4. The specimens disassembled following the termination of the electrical tests.

1.4. (8.4) CONDUCTOR

See Figure d1

a) Conductor material

- | | | |
|--------------|-----------|--------|
| • Conductor: | "a" | "b" |
| • Material: | Aluminium | Copper |

b) Nominal cross-section area, dimensions and shape

The following conductors were provided by the applicant for the needs of the tests.

- | | | |
|---------------------------------|----------------------|----------------------|
| • Conductor: | "a" | "b" |
| • Nominal cross sectional area: | 75 mm ² | 75 mm ² |
| • Nominal dimensions: | 25x3 mm | 25x3 mm |
| • Shape: | Solid tape | Solid tape |
| • Actual cross sectional area: | 74,2 mm ² | 75,4 mm ² |

1.5. (8.5) STANDARDS AND REFERENCES

a) Identification of the test standard used and the date of issue of the standard

IEC EN 62561-1:2017 "Lightning protection system components (LPSC) – Part 1: Requirements for connection components".

b) Other relevant documentation with the documentation date

- IEC EN 62561-2:2018 "Lightning protection system components (LPSC) – Part 2: Requirements for conductors and earth electrodes"
- IEC 60068-2-52:1996 "Environmental testing - Part 2-52: Tests - Test Kb: Salt mist, cyclic (sodium, chloride solution)"
- ISO 6988:1985 "Metallic and other non organic coatings - Sulfur dioxide test with general condensation of moisture"
- Component's installation instructions, provided by ABB FURSE.

1.6. (8.6) TEST PROCEDURE

a) Description of the test procedure

According to the applicable standard the following tests has to be performed:

- Inspection on installation instructions literature provided by the applicant as per clause 5.2 of the standard.
- Marking review as per clause 5.11 of the standard.
- Conditioning / ageing test as per clause 6.3.1 of the standard consisting of:
 - Salt mist treatment;
 - Humid sulphurous atmosphere treatment;
 - Ammonia atmosphere treatment, in case of specimens where any component part is made of copper alloy with a copper content less than 80%.
Conditioning / ageing tests as per clause 6.3.1 of the standard is not applicable on connection components designed to be completely embedded in concrete and bonding bars intended for indoor applications only, (clause 6.3.2).
- Electrical test as per clause 6.4 of the standard consisting of:
 - Three impulse discharge current shots at each specimen, of crest value limp of 50 kA for normal duty classification or 100 kA for heavy duty classification
 - Contact resistance measurement test as per clause 6.4.a of the standard.
 - Visual inspection of the specimens after the completion of the tests as per clause 6.4.b of the standard.
 - Loosening torque as per clause 6.4.c of the standard, in case of non-permanent connection component.
 - Measurement of the displacement of the component's conductors as per clause 6.4.d of the standard, in case of a non-permanent connection component except for connection arrangements B3 & B6.
 - Mechanical tensile force, in case of screw-less or permanent connection components.
- Static mechanical test to a second set of three new specimens as per clause 6.5 of the standard, if the connection component is intended to withstand a static mechanical load.
- Marking test as per clause 6.6 of the standard (not applicable in case of markings made by moulding, pressing or engraving).

For each test 3 specimens were used. The specimens were assembled in a typical arrangement as per Annex B of the standard, according to the applicant's instructions.

Requirements and results are illustrated in detail in clause 1.9 "Results and parameters recorded" of the present report.

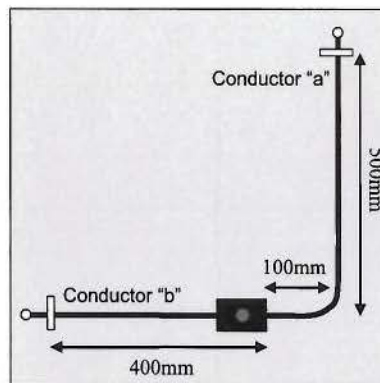
b) Justification for any deviations from, additions to or exclusions from the referenced standard

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

c) Any other information relevant to a specific test such as environmental conditions

All information is tabled in clause 1.9 of this report.

d) Configuration of testing assembly



B3: Inline connector – Test Arrangement

Figure d1

e) Location of the arrangement in the testing area and measuring techniques

Environmental / Ageing tests are performed in our laboratory's "conditioning test room".
The electrical tests are performed in our laboratory's "high voltage area".
Mechanical tests are performed in our laboratory's "Mechanical tests room".

1.7. (8.7) TESTING EQUIPMENT DESCRIPTION

1. Environmental chamber for salt mist ageing, serial nr. 4318.
2. Environmental chamber for humid sulphurous atmosphere ageing, serial nr. 4317.
3. Impulse current generator 100kA, 65C, 187kJ.
4. 4-channel trigger / delay pulse generator serial nr. 09720.
5. Shunt 1 mΩ.



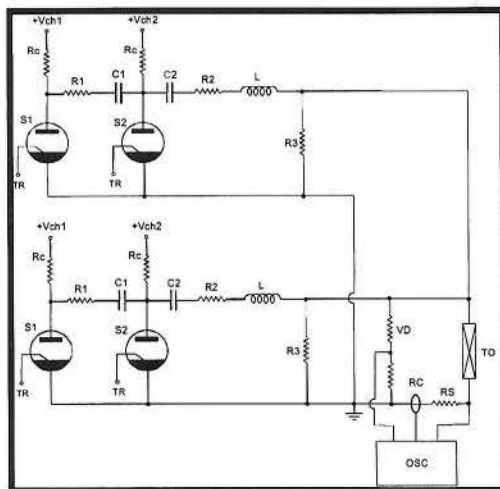
Photograph of the environmental ageing chamber used for salt mist ageing.



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



Photograph of the 100kA, 10/350µs impulse current generator.



- Vch1 : Start bank charging voltage S1 : Start switches
Vch2 : Sustain bank charging voltage S2 : Sustain switches
Rc : Charging Resistors TR : Triggering module
R1 : Start Resistor VD : Voltage Divider
R2 : Sustain resistor RC : Rogowski coil
R3 : Bleeding resistor RS : Resistive shunt
L : Stray inductance TO : Test object
C1 : Start Capacitor OSC : Oscilloscope
C2 : Sustain Capacitor

A schematic diagram of the 100kA, 10/350µs impulse current generator.

1.8. (8.8) MEASURING INSTRUMENTS DESCRIPTION

Instrument	Verification date	Verification interval
1. Electronic torque wrench, 6Nm, serial nr. 11058031.	2021/07/27	1 year
2. Torque meter, 30Nm, serial nr. 0901610877	2021/08/05	1 year
3. Digital micro-ohmmeter, 5µΩ-400Ω, serial nr. 166423.	2021/03/24	6 months
4. 4-channel, digital oscilloscope, serial nr. LCRY3203N57222.	2021/03/16	1 year
5. Temperature and humidity meter.	2021/07/23	1 year

1.9. (8.9) RESULTS AND PARAMETERS RECORDED

REQUIREMENTS			TESTS' RESULTS									PASS/ FAIL ⁽¹⁾	
SUB- CLAU SE OF 8.9	TEST – INSPECTION & CLAU SE OF STANDARD	IDENTIFICATION OF SPECIMEN											
		32032A			32032B			32032C					
	<u>Electrical test</u> <u>§6.4</u>	Shot number:	A1	A2	A3	B1	B2	B3	C1	C2	C3	PERFOR- MED (for PASS / FAIL criteria see § f to k).	
a)	Imp: 100kA*±10% W/R: 2500KJ/Ω±35% Front time ≤50µs Duration ≤5ms *Requested by the applicant.	Current peak limp (kA):	97,2	98,5	98,5	97,9	97,9	97,9	98,5	97,9	97,9		
b)		Charge Q (As):	44,68	44,05	44,81	45,25	44,44	45,19	45,04	44,48	45,16		
c)		Spec. energy W/R (kJ/Ω):	1996	1940	2008	2047	1974	2042	2028	1979	2039		
d)		Impulse front time (µs):	13,3	13,0	13,0	13,0	13,5	13,4	13,2	13,6	13,1		
e)		Impulse duration (ms):	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,8		
Environmental conditions during electrical tests (humid., temp., atm. pressure): 44 % - 24,9 °C – 992 mbar													
f)	<u>Contact resistance Rc (mΩ), §6.4.a</u> (requirement Rc ≤3 mΩ)	Rc: 2,889			Rc: 2,313			Rc: 0,490			PASS		
g)	<u>Tightening torque T_T (Nm) §6.4.c</u>	T _T : 12,0			T _T : 12,0			T _T : 12,0			PASS		
h)	<u>Loosening torque T_L (Nm) §6.4.c</u> (requirement 0,25T _T < T _L < 1,5T _T)	T _L : "a": 4,4 "b": 4,6			T _L : "a": 3,4 "b": 9,5			T _L : "a": 8,5 "b": 3,3					
i)	<u>Visual inspection, §6.4.b</u> (requirement: no cracks, loose parts, deformation impairing its normal use)	Y			Y			Y			PASS		
j)	<u>Conductors' length from connector, §6.4.d</u> (requirement: from 20 mm not less than 3 mm)	---			---			---			N/A		
k)	<u>Tensile force, §6.4.e</u> (applicable to screw-less components)	-			-			-			N/A		
l)	Installation instructions shall contain, §5.2:		Inspection's results (see copy in the Annex C):									PASS	
	5.2.a) classification of the component, as per clause 4 of standard, see (**) below:		5.2.a) Classification of the component, as per clause 4 of the standard, was provided as stated in detail below see (**):										
	5.2.b) recommended tightening torque		5.2.b) provided, 12 Nm									PASS	
	5.2.c) range of conductor sizes - materials		5.2.c) provided, 25x3 mm Al – 25x3 mm Cu									PASS	
	5.2.d) connection configuration		5.2.d) provided, B3 connection configuration									PASS	
	** Classification of the component shall contain:		** Concerning the classification of the component, in the installation instructions was provided:									PASS	
	4.1) the lightning current withstand ability: a) class H for heavy duty b) class N for normal duty		4.1) the ability to withstand lightning current: Classified as class H (4.1.a)										
	4.2) the installation location: a) general use b) embedded in concrete		4.2) the installation location: Classified as for general use (4.2.a)									PASS	
	4.3) the mechanical behaviour: a) withstand static mechanical load b) not withstand static mechanical load		4.3) mechanical behaviour Classified as not intended to withstand static mechanical load (4.3.b)									PASS	
	4.4) type of connection, permanent or not: a) permanent connection b) non-permanent connection		4.4) whether or not a connection is permanent Classified as non-permanent connection (4.4.b)									PASS	
Comments: No additional comments													

Y: Fulfills the requirements. **N:** Do not fulfils the requirements. **N/A:** Not applicable

REQUIREMENTS			TESTS' RESULTS						PASS/ FAIL ⁽¹⁾
SUBCLA USE OF 8.9	TEST – INSPECTION & CLAUSE OF STANDARD		IDENTIFICATION OF SPECIMEN						
			32032A		32032B		32032C		
m)	Conditioning, §6.3.1, Annex D								
	a) Salt mist treatment (IEC 60068-2-52) severity (2), three spray periods (three days)		a) Start : 2021/08/27 End : 2021/08/30 * Preliminary test with no PASS/FAIL criteria.						PERFOR- MED*
	b) Humid sulphurous atm. treatment (ISO 6988) for 7 cycles (days)		b) Start : 2021/08/30 End : 2021/09/06 * Preliminary test with no PASS/FAIL criteria.						PERFOR- MED*
	c) Ammonia atmosphere treatment (ISO 6957) for 24 h, moderate atmosphere with pH 10		c) Start : --- End : --- * Preliminary test with no PASS/FAIL criteria.						N/A
n)	<u>Static mechanical test</u> <u>900N±16N for 1 min, §6.5</u> (On a 2 nd set of specimens. Requirement: movement of the conductor <1 mm, no damage to conductor or component)	Conductor:	32032D		32032E		32032F		N/A
			"a"	"b"	"a"	"b"	"a"	"b"	
		Force (N):	---	---	---	---	---	---	
		Movement (mm):	---	---	---	---	---	---	
		Visual check:	---	---	---	---	---	---	
o)	Marking, §5.11 & §6.6: According to §5.11 marking shall contain:		Inspection's results:						
	(a) name or trade mark,		(a) name: FURSE engraved on the specimens (durable and legible)						PASS
	(b) identifying symbol**,		(b) identifying symbol: illustrated on the accompanying documentation (see copy in the Annex C)						PASS
	(c) classification**, which shall contain:		(c) classification:						PASS
	i) the lightning current withstand ability		i) the lightning current withstand ability: illustrated on the accompanying documentation (see copy in the Annex C)						PASS
	ii) the installation location		ii) installation location: illustrated on the accompanying documentation (see copy in the Annex C)						PASS
	iii) the mechanical behaviour		iii) the mechanical behaviour: illustrated on the accompanying documentation (see copy in the Annex C)						PASS
	iv) whether or not a connection is permanent:		iv) whether or not a connection is permanent: illustrated on the accompanying documentation (see copy in the Annex C)						PASS
** If impractical to be on the component may be given on the smallest packing unit label or on the accompanying documentation. According to §6.6, marking is checked by inspection and, by rubbing it by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with white spirit/mineral spirit. Markings made by moulding, pressing or engraving are not subjected to this test. Marking shall be durable and legible.									
Comments: No additional comments									

Y: Fulfills the requirements. **N:** Do not fulfils the requirements. **N/A:** Not applicable

⁽¹⁾ To establish the PASS/FAIL result where measurements apply, the relevant laboratory's calculated uncertainty combined with the standard's requirements has been considered. The reported expanded uncertainty is the result of the standard uncertainty (u) multiplied by a coverage factor k=2, providing a confidence level of 95%. For details see ANNEX A "Table of standard requirements combined with laboratory's uncertainties".

1.10. (8.10) STATEMENT OF PASS/FAIL

The connection components specimens, bimetallic connector with part number CN810-FU, submitted for tests by ABB FURSE, have been subjected to the tests according to IEC EN 62561-1:2017 for use in external lightning protection systems, in "in-line" connection arrangement (B3) between copper solid tape conductor of 25x3 mm dimensions and aluminium solid tape conductor of 25x3 mm dimensions and have successfully passed the tests.


Therefore they satisfy the standard's requirements for the above assembly and are classified as per their:

- Lightning current carrying capability as: class H (100kA).
- Installation location as : for general use.
- Mechanical behaviour as: not intended to withstand a static mechanical load.
- Connection type as: non-permanent.

Test results regarding this connection component specimen are displayed in clause 1.9 (8.9).

Note 1: The present document is the only evidence proving the performance of tests described in it and it cannot be replaced or substituted by any other document / declaration.

Note 2: The present test report refers exclusively to the verification of the characteristics only of the connection component CN810-FU according to standard IEC EN 62561-1:2017 and does not concern the characteristics of any additional or auxiliary materials used for the performance of the tests.

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

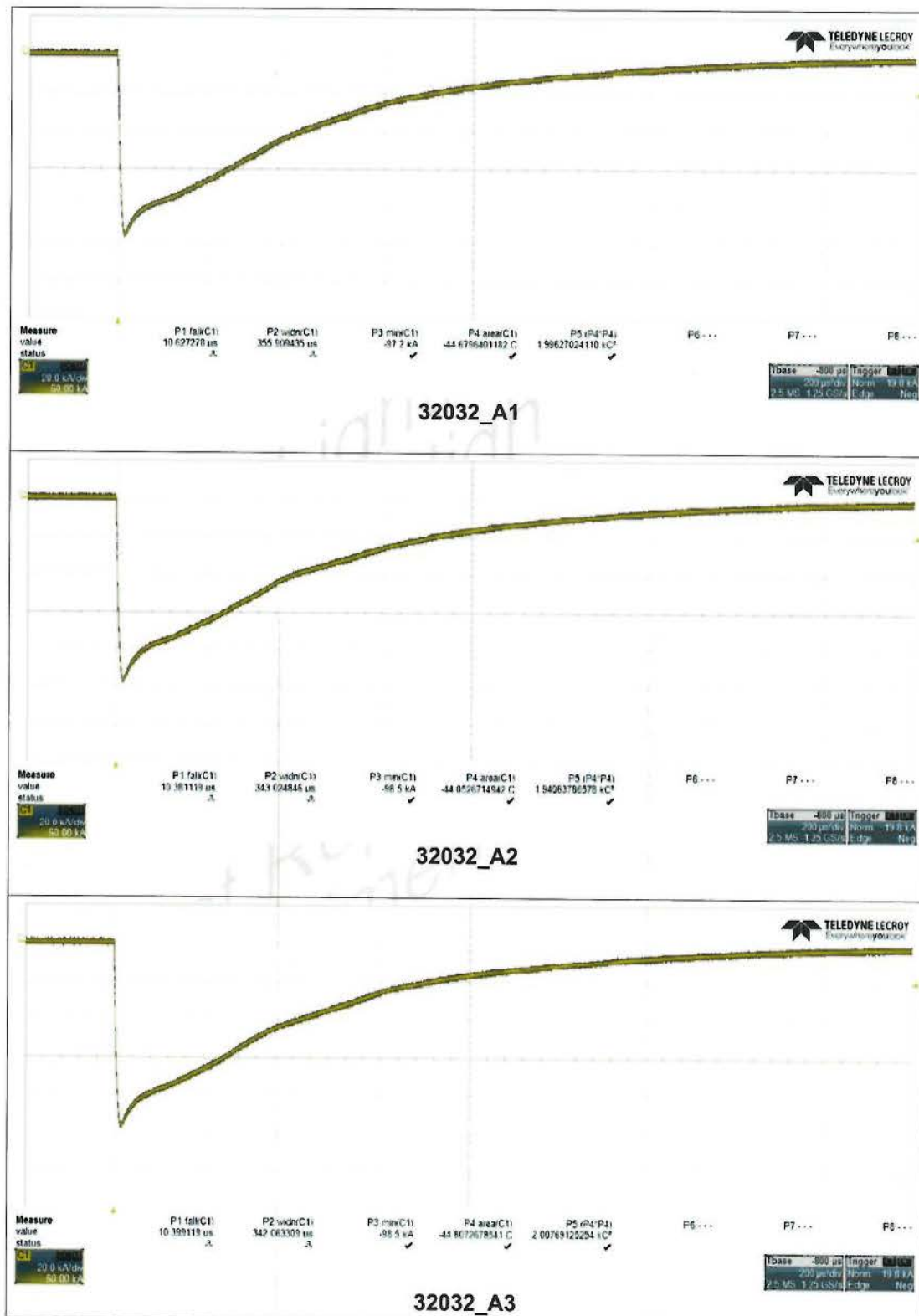
*This report only explains the specimens submitted for test and does not produce evidence for the quality for standard fabrication.
This test report is valid only for the item tested at this time and does not cover this item if technical change(s) might occur on it in the future*

ANNEX A: TABLE OF STANDARD REQUIREMENTS COMBINED WITH LABORATORY'S UNCERTAINTIES

Refers to the measured values of table 1.9 "Results and parameters recorded" and shows the standard's tolerances and the laboratory's calculated uncertainties. The reported expanded uncertainty is the result of the standard uncertainty (u) multiplied by a coverage factor k=2, providing a confidence level of 95%.

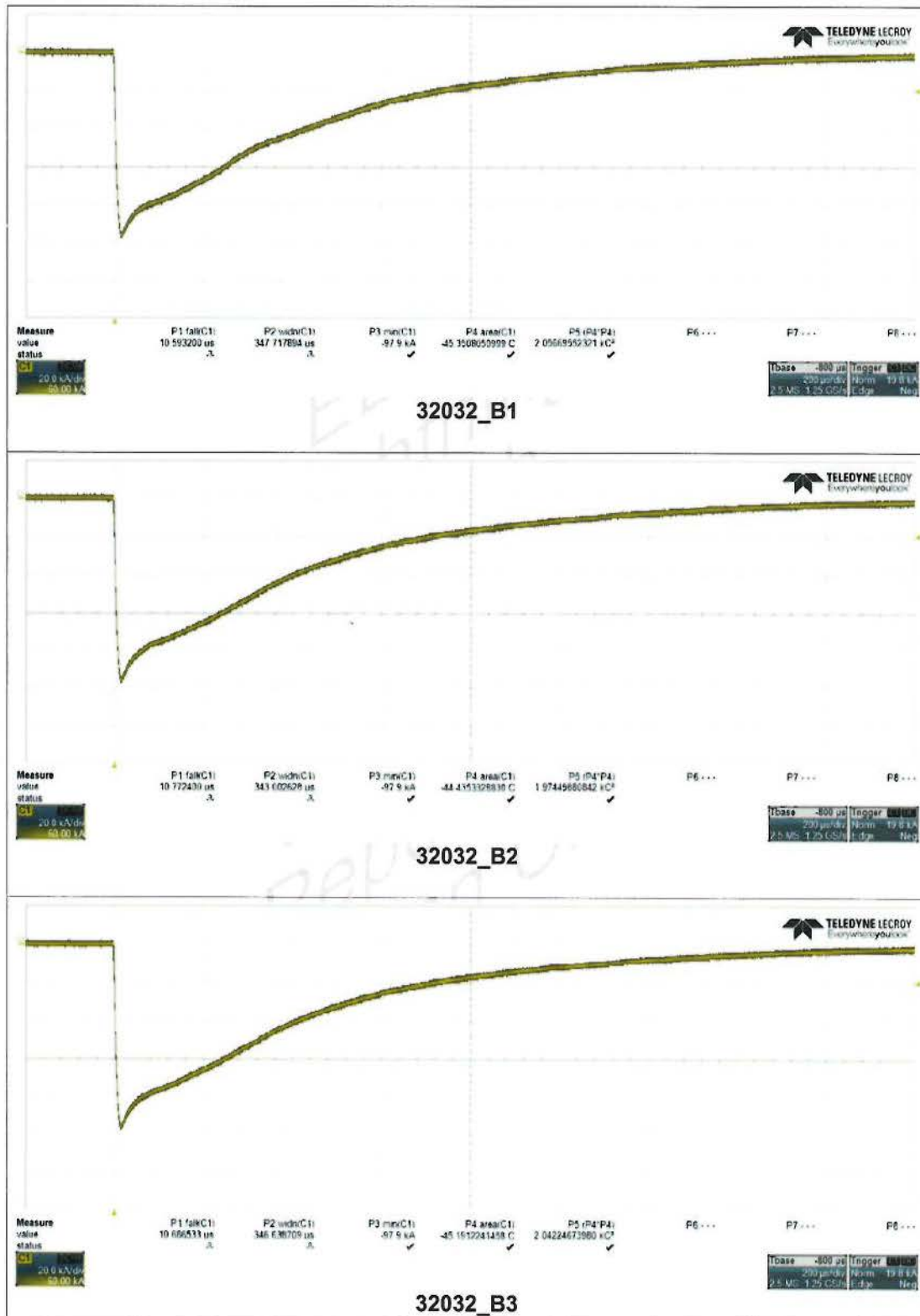
MEASURAND & CLAUSE OF STANDARD WHICH IS REFERED	STANDARD'S REQUIREMENTS	STANDARD'S REQUIREMENTS COMBINED WITH LABORATORY'S UNCERTAINTIES	LABORATORY'S UNCERTAINTIES
Impulse current (Iimp) clause 6.4	90 kA to 110 kA	92 kA to 108 kA	± 2 kA
Specific energy (W/R) clause 6.4	1625 kJ/Ω to 3375 kJ/Ω	1690 kJ/Ω to 3250 kJ/Ω	- 65 kJ/Ω + 125 kJ/Ω
Contact resistance (Rc) clause 6.4.a	≤ 3 mΩ	≤ 2,984 mΩ	± 0,016 mΩ
Loosening torque (TL) clause 6.4.c	0,25T _T < T _L < 1,5T _T T _T : Tightening torque (Nm)	0,26T _T < T _L < 1,45T _T	± 3,5 %

ANNEX B: OSCILLOSCOPE RECORDINGS OF THE IMPULSE CURRENT TESTS



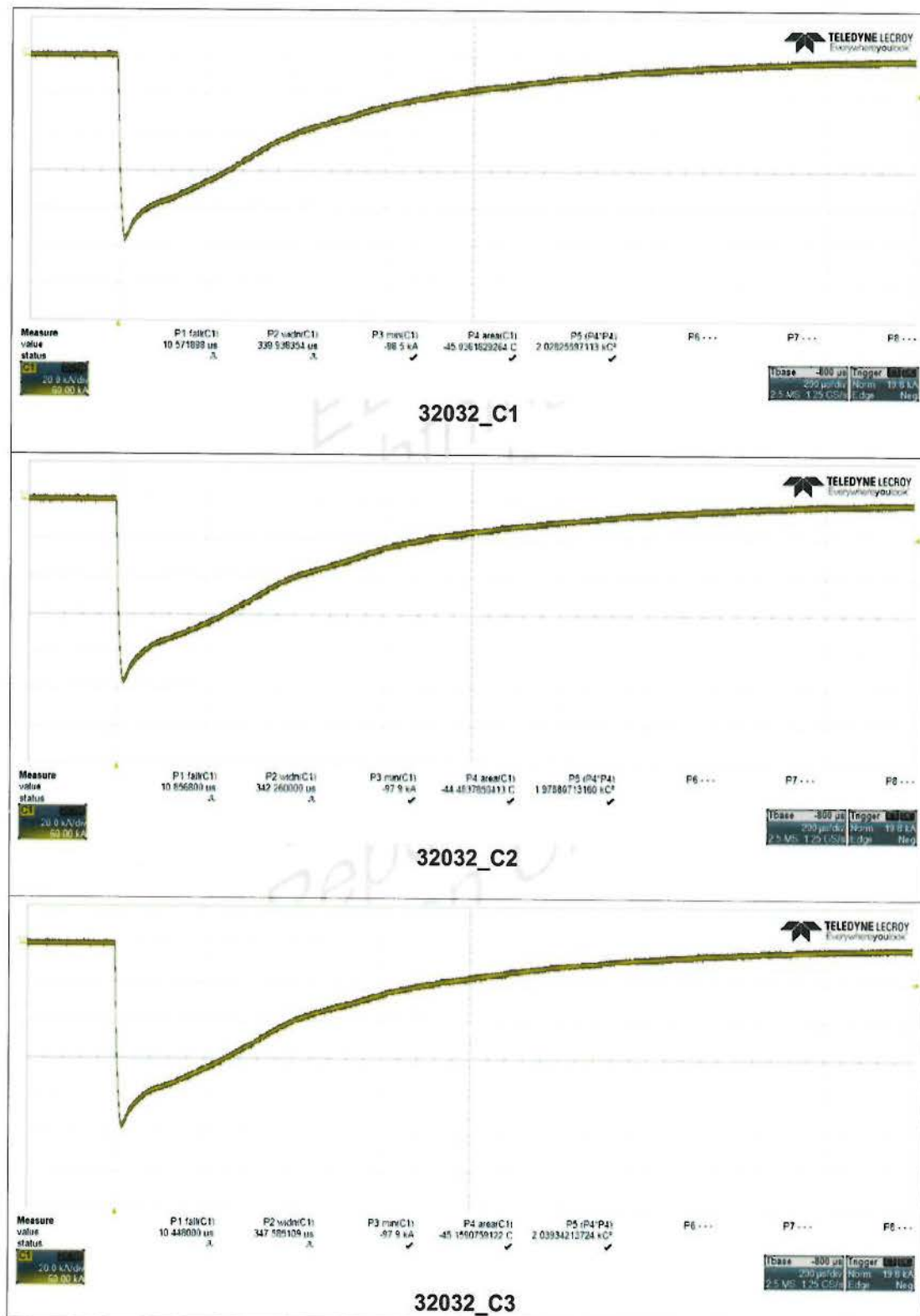
Test report No 32032/2021-09-21

LAB.1.1-02/E03-18/16



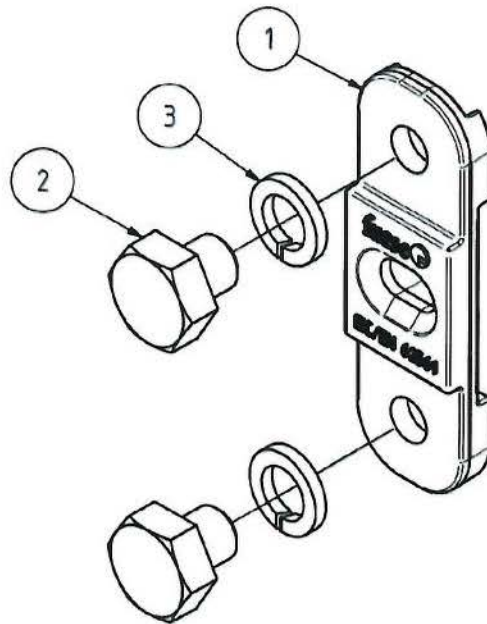
Test report No 32032/2021-09-21

LAB.1.1-02/E03-18/16



ANNEX C: SPECIMEN'S INSTALLATION INSTRUCTIONS



PARTS LIST			
ITEM	QTY.	DESCRIPTION	MATERIAL
1	1	BIMETALLIC CONNECTOR	Stainless Steel
2	2	BOLT, HEX HEAD, M10	Stainless Steel
3	2	WASHER, SPRING, M10	Stainless Steel



Application

Manufactured from high quality stainless steel for excellent corrosion resistance. Simple to install, providing a secure lightning protection system connection between aluminium tape and copper tape.

Suitable for 25 x 3 mm aluminium tape. Suitable for 25 x 3 mm copper tape.

furse  Earthing & Lightning Protection		ABB	
		ABB Ltd. Wilford Road, Nottingham, NG2 1EB United Kingdom	
ISSUED FOR: INFORMATION		ABB	
PRODUCT LINE: FURSE E & LP		ABB	
MATERIAL: SEE PARTS LIST		ABB	
FINISH: SELF COLOUR		ABB	
FIRST ANGLE PROJECTION 		ABB	
1. DO NOT SCALE 2. ALL DIMENSIONS SHOWN ARE BEFORE STATED FINISH. 3. REMOVE ALL BURRS AND SHARP EDGES.		ABB	
ORIGINAL	DATE	NAME	DRAWING NUMBER:
DRAWN	21/07/2021	J. MATTHEWS	CN810-FU TS 01
CHECK'D	21/07/2021	A. MERRILL	REV:
APPR'D	21/07/2021	J. MATTHEWS	A
FILE: C:\Users\gbjumat\Desktop\CN810-FU_TS_01_A.dwg			SHEET 1 OF 3
CAD (INVENTOR) GENERATED DRAWING DO NOT CHANGE MANUALLY			SHEET REF: QADC4_A4 Rev 6.1 SIZE: A4

Standards

Furse part number CN810-FU is tested in accordance with IEC 62561-1 Lightning Protection System Components (LPSC) - Part 1: Requirements for connection components. Testing was carried out on an arrangement of 25 x 3 mm aluminium tape to 25 x 3 mm copper tape.

IEC 62561-1 Classification:

- According to the ability to withstand lightning current - Class H
- According to the installation location - General use.
- According to the mechanical behavior - Not intended to withstand a static load.
- According to whether or not connection is permanent - Non-permanent connection.

Other information

- Test arrangement B3.

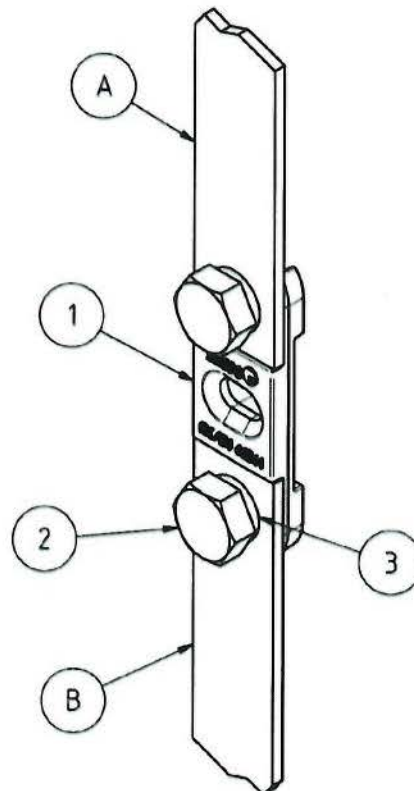
Installation instructions

Tools Required:

Cross point screw driver and 17 mm spanner or socket.

The following general instructions relate to fixing the bimetallic connector to masonry or concrete.

- Place the bimetallic connector [1] in it's final position.
- Mark the position of the fixing hole in the body onto the masonry/concrete.
- Drill a 7 mm diameter hole at the position previously marked and insert an appropriate plastic wallplug.
- Fix the bimetallic connector [1] using 1 no. 1.5 inch, No.10 wood screw.
- Centrally mark and drill an Ø11 mm hole on 25 x 3mm aluminium tape [A] and 25 x 3mm copper tape [B] 12.5 mm from the cut end. Check alignment of drilled holes against threaded holes.
- Place the hex head bolt [2] through the hole in conductors [A&B], whilst ensuring that a spring washer [3] is between bolt [2] and conductors [A&B]. Tighten until all parts are loosely held in place.
- Ensure all parts and conductors are correctly aligned then tighten hex head bolts [2] evenly to specified torque (12 Nm).



DRAWING NUMBER	REV
CN810-FU TS 01	A

FILE: C:\Users\gbjumat\Desktop\CN810-FU_TS_01_A.dwg

SHEET 2 OF 3

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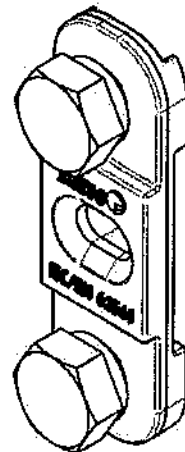
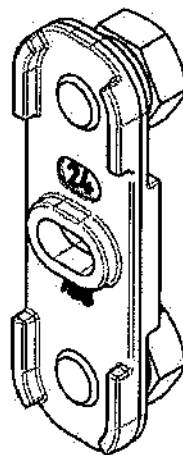
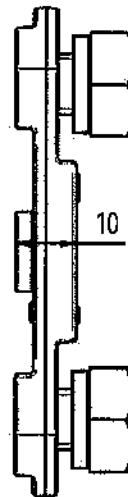
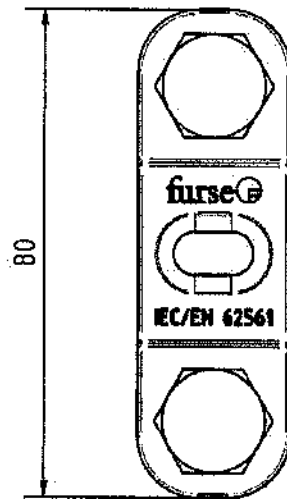
SHEET REF: QADC4_A4 Rev 6.1

SIZE: A4

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Dimensions

All dimensions shown in millimetres.



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CN810-FU TS 01

REV

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SHEET 3 OF 3

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SHEET REF: QADC4_A4 Rev 6.1

SIZE: A4

3. Revisions

Rev.	Page (P) Chapt. (C)	Description	Date Dept./Init.
A	All	First release	2021-10-12 GBNTG R&D/JM

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