

1. Equipment used during test.**1.1 Equipment used**

N° U.T.	Designation	Characteristic
99 01 48	Thermometer indicated	Accuracy 2°C
93 05 48	Crimping machine	50 kN
02 01 35	50 µm thick gauge	Accuracy ± 1.5 µm
?	Dies F173	Width 9 mm

1.2 Cables :

Section (mm ²)	150
Nature	Aluminium
Standard	UNE 21-050-92 (12/1992)
From	Spain
Identification n°	05024
Conditioned on	27/06 2006 (1 h at 120°C)

2. Product tested.

Designation : CPTA 150
 Number : 2
 Batch number : 09M03278
 Stamping : See annex 1
 Identification : 1 and 2
 Reception date at the laboratory : on the 03/02/2010

На основание чл. 2
от ЗЗЛД

ВЯРНО С ОРГАНИЗАТА

САМОВ

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3. Test.

Pre-insulated terminal lug are tested according to NF C 33-021 § 2.3.1 (june 98) standard.

3.1 Test procedure.

Crimping of the joint sleeve or terminal lug on the relevant core(s) shall be carried out using dies in compliance with table B 1 of annex B of the standard. The minimum compression strength given in table B 2 of annex B of the standard shall be applied.

3.3 Preparation

A 9 mm wide dies for groove F173 is used.

4. Requirements

The two half-dies shall be in contact, which means that a 0.05 mm thick gauge cannot be inserted between the half-dies.

5. Results

	Standard requirements	Results
Ambient temperature and humidity conditions	Between 15 et 35°C Between 25 % et 75 % HR	21°C 25 % HR
A 0.05 mm thick gauge is inserted between the half-dies	No	Sample 1 : no Sample 2 : no

6. Conclusion

The two half-dies are in contact, which means that a 0.05 mm thick gauge cannot be inserted between the half-dies.

На основание чл. 2
от ЗЗЛД

ВЯРНО С ОРИГИНАЛА

ОСД
САМОКОВ

Test report : water tightness Test
Test number : 10 02 321
Product brand : SICAME
Product type : CPTA 150

Demandeur of the test : SICAME DER

Starting date of the test : 08/02/2010

Report emission date : 12 FEB. 2010

According to standard : NFC 33 021 § 2.4.3 and 2.4.4 (June 98)

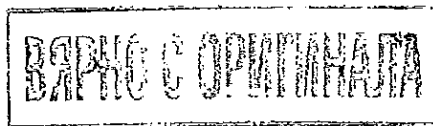
This report contains : 3 pages and 1 annex

Conclusion : The tested SICAME LV pre-insulated terminal logs type CPTA 150 conform to the requirements of NFC 33 021 § 2.4.3 and 2.4.4 (June 98) standard.

This is an English translation. The original French test report is the only reference version

На основание чл. 2
от ЗЗЛД

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021

1 Equipment used during test.

1.1 Equipment used

N° U.T.	Designation	Characteristic
99 01 48	Indicator thermometer	Accuracy 2°C
93 05 48	Crimping machine	Strength 50 kN
93 02 04	Water tank	
97 02 02	Calibrated ruler	Accuracy 0,5mm
	Dies E173	Width 9 mm

1.2 Cables

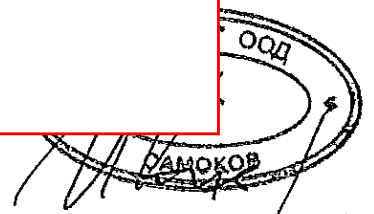
Section (mm ²)	150
Nature	Aluminium
From	Spain
Standard	UNE 21-030-92 (12/1992)
Identification n°	05024
Conditioned on	27/06/2006 (1h at 120°C)

2 Product tested

Designation : CPTA 150
 Quantity : 2
 Batch number : 09M93278
 Marking : See annex 1
 Identification : 1 and 2
 Reception date at the laboratory on the : 03/02/2010

На основание чл. 2
от ЗЗЛД

ВЯРНО С ОПРИГНАЛАТА



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3 Test procedure

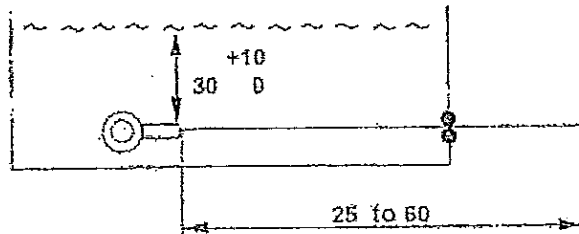
Connectors are tested according to NFC 33 021 § 2.4.3 and 2.4.4 (June 98) standard.

3.1 Procedure

The assembly made by the lug and the conductor is placed at the bottom of a tank filled with water. The height of water is (30 ± 10) cm measured above the lug.

The core crosses out of the tank through an appropriate seal which avoids any excessive stress on the core insulation according to figure below.

The assembly is left in the water for 24 h.



dimensions in cm

3.2 Preparation

A F173 groove with 9 mm wide dies is used.

4 Requirements

No trace of water shall be observed at the end of the core.

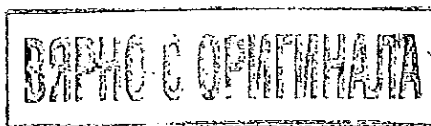
5 Results

	Standard requirements	Results
Ambient temperature and humidity conditions	Between 15 and 35°C Between 25 and 75% HR	22°C 32 % HR
Duration of immersion	24 h 00	24 h 00
Immersion depth	30 ± 10 cm	35 cm

6 Conclusion

No trace of water is observed at the end of the core after the 24h.

На основание чл. 2
от ЗЗЛД



**СПИСЪК НА ОТДЕЛНИТЕ ИЗПИТВАНИЯ НА ИЗОЛИРАН ПРЕСОВ
НАКРАЙНИК ТИП СРТА 150**

1. № на тест: 1002102 - Изпитване на способността за пресоване;
2. № на тест: 1002321 - Тест за водонепропускливост.

Съставил:



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LABORATOIRE D'ESSAIS
TEST LABORATORY

RAPPORT D'ESSAIS TEST REPORT

ESSAIS DE QUALIFICATION DES
COSSES PREISOLEES CPTAU
(K159, K160, K163, K164, K165, K166 ET K167)
N° 130-06-03-03

QUALIFICATION TESTS OF CPTAU PREINSULATED LUGS
(K159, K160, K163, K164, K165, K166 AND K167)
N° 130-06-03-03

25/04/2006

DEMANDEUR : Bureau d'Etudes MICHAUD SA
REQUESTED BY : MICHAUD SA's Research Department

PRESENTATION : Ce document regroupe les essais de qualification des cosses préisolées CPTAU 16 (K159), CPTAU 25 (K160), CPTAU 35 (K163), CPTAU 50 (K164), CPTAU 54N (K165), CPTAU 70 (K166) et CPTAU 95 (K167). Les matériels testés sont de fabrication MICHAUD SA.

INTRODUCTION : Les modalités d'essais retenues sont celles de la norme NF C 33-021 de Juin 1998.
This document gathers the qualification tests of preinsulated lugs CPTAU 16 (K159), CPTAU 25 (K160), CPTAU 35 (K163), CPTAU 50 (K164), CPTAU 54N (K165), CPTAU 70 (K166) and CPTAU 95 (K167). Tested products are of MICHAUD's manufacture.
The test procedures are the ones of the standard NF C 33-021 dated June 1998.

На основание чл. 2
от ЗЗЛД

Le Responsable
The test
N. P
Date

На основание чл. 2
от ЗЗЛД

DIFFUSION : Le 25/04/2006 - 1 exemplaire original UR (LE)
Le 18/02/2011 - 1 exemplaire original VAK-02 (Bulgarie)
- 1 exemplaire original COM (Classement Client)

ISSUANCE : On the 25/04/2006 - 1 original to UR (LE)
On the 18/02/2011 - 1 original to VAK-02 (Bulgaria)
- 1 original to COM (Customer filing)

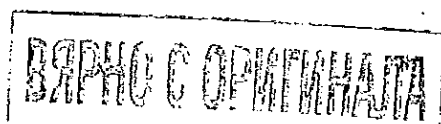
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Any copy of this test report is authorized only as a complete photographic facsimile after written authorization from the test laboratory of MICHAUD SA. The test report hereafter concerns only the samples tested.

Ce document comporte 29 pages (y compris la présente page 1).
This document includes 29 pages (including this page 1).

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(*) The numbers of paragraph are given in the standard NF C 33-021 dated June 1998.



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D) INTRODUCTION

1.1 Subject

This document gathers the qualification tests of preinsulated lugs CPTAU 16 (K159), CPTAU 25 (K160), CPTAU 35 (K163), CPTAU 50 (K164), CPTAU 54N (K165), CPTAU 70 (K166) and CPTAU 95 (K167). Tested products are of MICHAUD's manufacture.

Test procedures are the ones of the standard NF C 33-021 dated June 1998.

For each test, there is a test sheet gathering procedures and results.

1.2 Tested products

Tested products are preinsulated lugs for copper equipment terminal according to the technical file «CPTAU». These products are coming from an industrial series and have been delivered to Test Laboratory on 16/01/2006.

DESIGNATION	REFERENCE	N° OF BATCH
CU TERMINAL LUG (E140) CPTAU 16	K 159	05 49 18
CU TERMINAL LUG (E140) CPTAU 25	K 160	04 49 50
CU TERMINAL LUG (E173) CPTAU 35	K 163	00 20 21
CU TERMINAL LUG (E173) CPTAU 50	K 164	05 47 52
CU TERMINAL LUG (E173) CPTAU 54N	K 165	02 27 31
CU TERMINAL LUG (E173) CPTAU 70	K 166	05 50 55
CU TERMINAL LUG (E173) CPTAU 95	K 167	05 50 56

1.3 Order of test

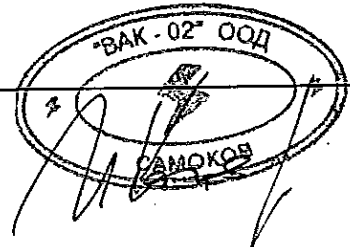
Tests are performed on 6 lugs CPTAU 16, CPTAU 35, CPTAU 50, CPTAU 54N and CPTAU 70, 12 lugs CPTAU 25 and 14 lugs CPTAU 95.

NUMBER OF SAMPLES			TESTS
CPTAU 16, CPTAU 35, CPTAU 50, CPTAU 54N, CPTAU 70	CPTAU 25	CPTAU 95	
1 and 2	1 and 2	1 and 2	2.3.2 Mechanical tests – Tensile test
3 and 4	3 and 4	/	2.4 Dielectric and watertightness tests
/	/	3 up to 6	2.4 Dielectric and watertightness tests 2.6 Climatic ageing test
5 and 6	5 and 6	7 and 8	2.7 Corrosion test
/	7 up to 12	9 up to 14	2.8 Electric ageing test

II) STANDARD DOCUMENTS REFERRED TO IN THIS REPORT

- French standards

C 20-540 : June 2002,
«Environmental test - Test methods - Climatic ageing test of equipment and synthetic materials for outdoor use».



- NF C 33-004 : June 1998,
«Insulated cables and their accessories for power systems - Connecting equipment for overhead distributions and services of rated voltage 0,6/1kV with at least one insulated core - Electrical ageing test».
- NF C 33-021 : June 1998,
«Insulated cables and their accessories for power systems - Preinsulated compression type connecting equipment for overhead distributions and services of rated voltage 0,6/1kV with bundle assembled cores».
- NF C 33-209 : July 1996,
«Insulated or shielded cables for power systems - Bundle assembled cores for overhead systems of rated voltage 0,6/1kV».

III) GENERAL CONDITIONS

• Temperature.

Tests are carried out at the room temperature of the test laboratory between 20°C and 26°C.

• Cores used

STANDARD	NAME OF MANUFACTURER	NOMINAL CROSS-SECTIONAL AREA (in mm ²)	NUMBER OF STRANDS AND COMPOSITION OF CORE	Ø OVER INSULANT (in mm)	Ø OVER CORE (in mm)
NF C 33-209	NEXANS	95	19 strands aluminium	15,0	11,2
		70	12 strands aluminium	13,6	10,1
		54,6N	7 strands aluminium alloy	12,5	9,4
		50	7 strands aluminium	11,2	8,3
		35	7 strands aluminium	10,6	7,1
		25	7 strands aluminium	9,0	6,0
		16	7 strands aluminium	7,4	4,8

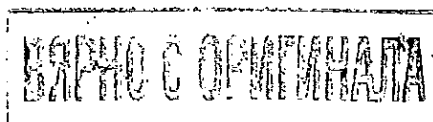
Before tests, cores are conditioned, according to § 2.2.2 of the standard NF C 33-021 as follows : they are put in an enclosure during 1 h at 120°C, then the door of enclosure is opened so that conductors come back to room temperature. Furthermore, sheath and insulant are removed from main conductors.

• Spacer for electric ageing test

It is a 14mm thickness copper tool with section equal to the linking palms.

IV) TESTS

On the following pages, sheets of each performed test can be found.



TEST DESCRIPTION : 2.3.2 Mechanical tests – Tensile test

Page 1/2

DATE : 19/01/2006 AND 20/01/2006
PLACE : MICHAUD test laboratory

OPERATOR : AC. BERNARD

N° OF SAMPLES : 1 and 2 for each type of lugs

TEST EQUIPMENTS

- Measure equipment for traction / compression
- Mechanical tensile strength and endurance bench

PROCEDURES

Procedures and acceptance criteria are the ones of § 2.3.2 of standard NF C 33-021 dated June 1998.

Samples are fitted on 30cm length aluminium cores stripped over the length indicated on the item. They are crimped with a pneumatic jack and adapted dies.

So as to assure a good crimping, we check that a 0,05 mm thick wedge does not go in.

Then, the assembly lug - cores is installed between the clamping jaws of the tensile strength machine. Then, an increasing tensile strength is applied on the conductor core which progress is comprised between 1 000N/min and 5 000N/min up to the following F1 values and for the following duration :

- 600N for 1 minute for 16mm² and 25mm² conductors,
- 1 700N for 1 hour for neutral 54,6mm² conductor,
- 1 300N for 1 minute for the other conductors.

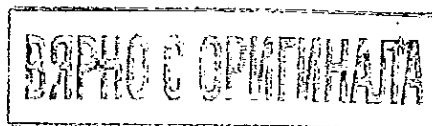
Then, the strength is raised up to the following F2 values, then it is released :

- 1 200N for 16mm² and 25mm² conductors,
- 2 500N for the other conductors.

No slip shall be noticed.

TEST RESULTS

TYPE OF LUGS	N° OF SAMPLE	PREVIOUS TEST	SECTION OF CONDUCTOR (in mm ²)	F1 STRENGTH APPLIED DURING THE STEP (in N)	F2 STRENGTH APPLIED (in N)	COMMENTS	FOLLOWING TEST
CPTAU 16	1	/	16mm ² Al	600	1 200	Satisfactory	/
	2	/		600	1 200	Satisfactory	
CPTAU 25	1	/	25mm ² Al	600	1 200	Satisfactory	/
	2	/		600	1 200	Satisfactory	
CPTAU 35	1	/	35mm ² Al	1 300	2 500	Satisfactory	/
	2	/		1 300	2 500	Satisfactory	
CPTAU 50	1	/	50mm ² Al	1 300	2 500	Satisfactory	/
	2	/		1 300	2 500	Satisfactory	



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TEST LABORATORY

TEST REPORT

QUALIFICATION TESTS OF CPTAU PREINSULATED LUGS (K159, K160, K163, K164,
K165, K166 AND K167) N° 130-06-03-03

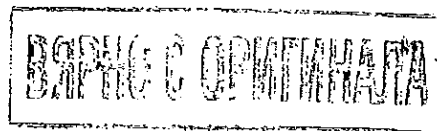
Date : 25/04/06
Page : 6/29

TEST DESCRIPTION: 2.3.2 Mechanical tests – Tensile test

Page 2/2

TEST RESULTS

TYPE OF LUGS	N° OF SAMPLE	PREVIOUS TEST	SECTION OF CONDUCTOR (in mm ²)	F1 STRENGTH APPLIED DURING THE STEP	F2 STRENGTH APPLIED (in N)	COMMENTS	FOLLOWING TEST
CPTAU 54N	1	/	54,6mm ² Al alloy	1 700	2 500	Satisfactory	/
	2			1 700		Satisfactory	
CPTAU 70	1	/	70mm ² Al	1 300	2 500	Satisfactory	/
	2			1 300		Satisfactory	
CPTAU 95	1	/	95mm ² Al	1 300	2 500	Satisfactory	/
	2			1 300		Satisfactory	



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TEST REPORT
QUALIFICATION TESTS OF CPTAU PREINSULATED LUGS (K159, K160, K163, K164,
K165, K166 AND K167) N° 130-06-03-03

Date : 25/04/06
Page : 7/29

TEST DESCRIPTION : 2.4 Dielectric and watertightness tests

Page 1/2

DATE : 01/03/2006, 02/03/2006 AND 06/03/2006
PLACE : MICHAUD test laboratory

OPERATORS : AC. BERNARD

N° OF SAMPLES : 3 up to 6 for lugs CPTAU 95
3 and 4 for the other type of lugs

TEST EQUIPMENTS

- Measure equipment for traction / compression

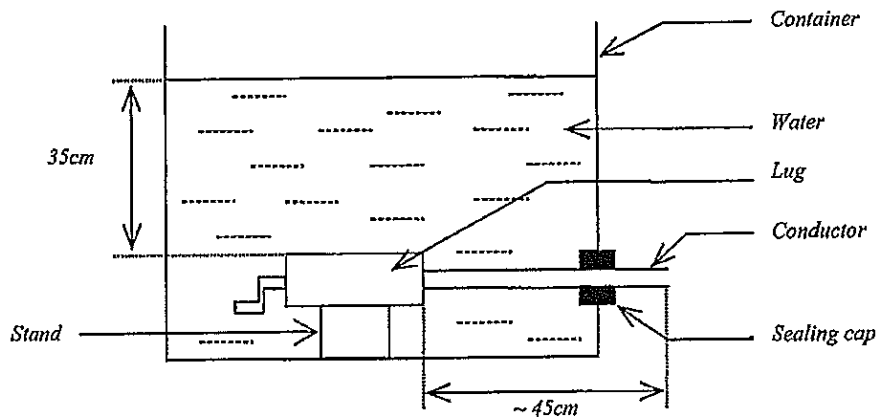
PROCEDURES

Procedures and acceptance criteria are the ones of § 2.4.3 and § 2.4.4 of standard NF C 33-021 dated June 1998.

Samples are fitted on 45cm length aluminium cores previously stripped over the length indicated on the item. They are crimped with a pneumatic jack and adapted dies.

So as to assure a good crimping, we check that a 0,05 mm thick wedge does not go in.

The assembly lug - core is laid in water for 24 hours, as shown below :



At the end of the test, no water trace shall appear below the conductor end.

TEST RESULTS

TYPE OF LUGS	N° OF SAMPLE	PREVIOUS TEST	SECTION OF CONDUCTOR (in mm ²)	COMMENTS AFTER 24 HOURS UNDER WATER	FOLLOWING TEST
CPTAU 16	3	/	16mm ² Al	Satisfactory : no water trace	/
	4			Satisfactory : no water trace	
CPTAU 25	3	/	25mm ² Al	Satisfactory : no water trace	/
	4			Satisfactory : no water trace	
CPTAU 35	3	/	35mm ² Al	Satisfactory : no water trace	/
	4			Satisfactory : no water trace	

ВАРНО С ОБЩИНАТА



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TEST LABORATORY

TEST REPORT
QUALIFICATION TESTS OF CPTAU PREINSULATED LUGS (K159, K160, K163, K164,
K165, K166 AND K167) N° 130-06-03-03

Date : 25/04/06
Page : 8/29

TEST DESCRIPTION: 2.4 Dielectric and watertightness tests

Page 2/2

TYPE OF LUGS	N° OF SAMPLE	PREVIOUS TEST	SECTION OF CONDUCTOR (in mm ²)	COMMENTS AFTER 24 HOURS UNDER WATER	FOLLOWING TEST
CPTAU 50	3	/	50mm ² Al	Satisfactory : no water trace	/
	4			Satisfactory : no water trace	
CPTAU 54N	3	/	54,6mm ² Al alloy	Satisfactory : no water trace	/
	4			Satisfactory : no water trace	
CPTAU 70	3	/	70mm ² Al	Satisfactory : no water trace	/
	4			Satisfactory : no water trace	
CPTAU 95	3	/	95mm ² Al	Satisfactory : no water trace	2.6
	4			Satisfactory : no water trace	
	5			Satisfactory : no water trace	
	6			Satisfactory : no water trace	

ВАРНОЕ С ОПИГНАНАТА



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TEST REPORT

QUALIFICATION TESTS OF CPTAU PREINSULATED LUGS (K159, K160, K163, K164,
K165, K166 AND K167) N° 130-06-03-03

Date : 25/04/06
Page : 9/29

TEST DESCRIPTION : 2.6 Climatic ageing test

Page 1/2

DATE : FROM 06/03/2006 TO 19/04/2006
PLACE : MICHAUD laboratory test

OPERATORS : AC. BERNARD

N° OF SAMPLES : 3 up to 6 for lugs CPTAU 95

TEST EQUIPMENTS

- Climatic ageing enclosure XR 35

PROCEDURES

Procedure and acceptance criteria are the ones of § 2.6 of standard NF C 33-021 dated June 1998.

CLIMATIC TEST

Procedures of this test are the ones of standard C 20-540 dated June 2002.

Samples support 6 weekly cycles, the enclosure temperature being 70 (± 2) °C for the conditionings A and C.

ACCEPTANCE CRITERIA

After test, samples are kept between 24 hours and 72 hours at the room temperature of the laboratory.

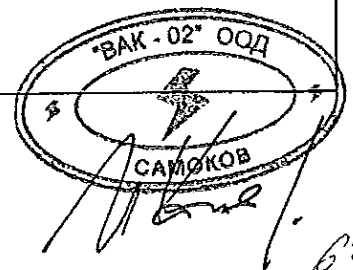
Then, they are tested accordingly :

- ◊ Watertightness test : A watertightness test is performed on the assembly according to § 2.4 of this report, during 12 hours under water. At the end, no water trace shall appear below the conductor end.
- ◊ Visual control : At the end of the tests, marking of the pieces shall be legible when examined with normal or correction vision without magnification.

TEST RESULTS

TYPE OF LUGS	SAMPLE N°	PREVIOUS TEST	COMMENTS AFTER CLIMATIC TEST	WATERTIGHTNESS TEST	LEGIBILITY IDENTIFICATION MARKING	FOLLOWING TEST
CPTAU 95	3	2.4	No visible damage (the body has slightly whitened and the cap has slightly faded on the side exposed to UV)	Satisfactory No water trace	Satisfactory	/
	4		No visible damage (the body has slightly whitened and the cap has slightly faded on the side exposed to UV)	Satisfactory No water trace	Satisfactory	

ВАРНОЕ С ОПИТАНИЕМАТА



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MICHAUD SA
TEST LABORATORY

TEST REPORT
QUALIFICATION TESTS OF CPTAU PREINSULATED LUGS (K159, K160, K163, K164,
K165, K166 AND K167) N° 130-06-03-03

Date : 25/04/06
Page : 10/29

TEST DESCRIPTION : 2.6 Climatic ageing test

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TYPE OF LUGS	SAMPLE N°	PREVIOUS TEST	COMMENTS AFTER CLIMATIC TEST	WATERTIGHTNESS TEST	LEGIBILITY IDENTIFICATION MARKING	FOLLOWING TEST
CPTAU 95	5	2.4	No visible damage (the body has slightly whitened and the cap has slightly faded on the side exposed to UV)	Satisfactory No water trace	Satisfactory	/
	6		No visible damage (the body has slightly whitened and the cap has slightly faded on the side exposed to UV)	Satisfactory No water trace	Satisfactory	



ВАРНО С ОБИГНАТА

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TEST DESCRIPTION : 2.7 Corrosion test

Page 1/2

DATE : 21 AND 22/03/2006

OPERATORS : AC. BERNARD

PLACE : MICHAUD laboratory test

N° OF SAMPLES : 7 and 8 for lugs CPTAU 95
5 and 6 for the other types of lugs

TEST EQUIPMENTS

- Corrosion enclosure

PROCEDURES

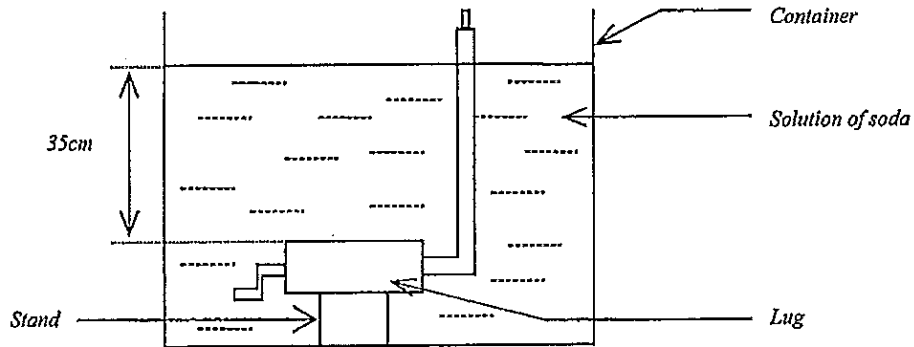
Procedures and acceptance criteria are the ones of § 2.7 of standard NF C 33-021 dated June 1998.

Samples are fitted on aluminium cores previously stripped over the length indicated on the item. They are crimped with a pneumatic jack and adapted dies.

So as to assure a good crimping, we check that a 0,05 mm thick wedge does not go in.

The assemblies lug - conductor are placed to the bottom of a container under 35cm of a normal solution of soda (40g of soda / l of water) at the room temperature.

Insulated cores ends emerge from water. The duration of immersion is 24 hours.

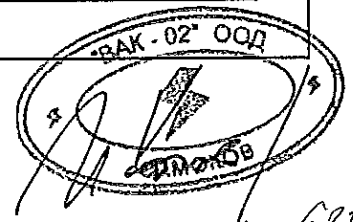
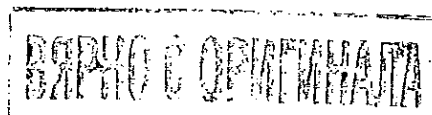


Then, the lug is stripped and no trace of corrosion shall be observed on aluminium parts.

TEST RESULTS

TYPE OF LUGS	N° OF SAMPLE	PREVIOUS TEST	SECTION OF CONDUCTOR (in mm ²)	COMMENTS AFTER 24H UNDER SODA SOLUTION	FOLLOWING TEST
CPTAU 16	5	/	16mm ² Al	Satisfactory : no trace of corrosion	/
	6			Satisfactory : no trace of corrosion	
CPTAU 25	5	/	25mm ² Al	Satisfactory : no trace of corrosion	/
	6			Satisfactory : no trace of corrosion	

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TEST DESCRIPTION : 2.7 Corrosion test

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TEST RESULTS

TYPE OF LUGS	N° OF SAMPLE	PREVIOUS TEST	SECTION OF CONDUCTOR (in mm ²)	COMMENTS AFTER 24H UNDER SODA SOLUTION	FOLLOWING TEST
CPTAU 35	5	/	35mm ² Al	Satisfactory : no trace of corrosion	/
	6			Satisfactory : no trace of corrosion	
CPTAU 50	5	/	50mm ² Al	Satisfactory : no trace of corrosion	/
	6			Satisfactory : no trace of corrosion	
CPTAU 54N	5	/	54,6mm ² Al alloy	Satisfactory : no trace of corrosion	/
	6			Satisfactory : no trace of corrosion	
CPTAU 70	5	/	70mm ² Al	Satisfactory : no trace of corrosion	/
	6			Satisfactory : no trace of corrosion	
CPTAU 95	7	/	95mm ² Al	Satisfactory : no trace of corrosion	/
	8			Satisfactory : no trace of corrosion	

ВЪРНО С ОРМЕНИНАТА



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MICHAUD SA
TEST LABORATORY

TEST REPORT
QUALIFICATION TESTS OF CPTAU PREINSULATED LUGS (K159, K160, K163, K164,
K165, K166 AND K167) N° 130-06-03-03

Date : 25/04/06
Page : 13/29

TEST DESCRIPTION: 2.8 Electric ageing test

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DATE: FROM 14/03/2006 TO 05/04/2006
PLACE: MICHAUD test laboratory

OPERATORS: AC. BERNARD

N° OF SAMPLES: 7 up to 12 for lugs CPTAU 25
9 up to 14 for lugs CPTAU 95

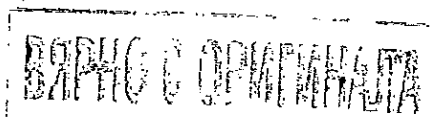
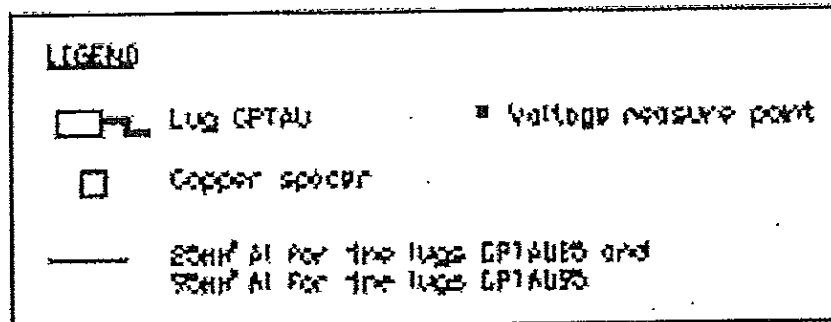
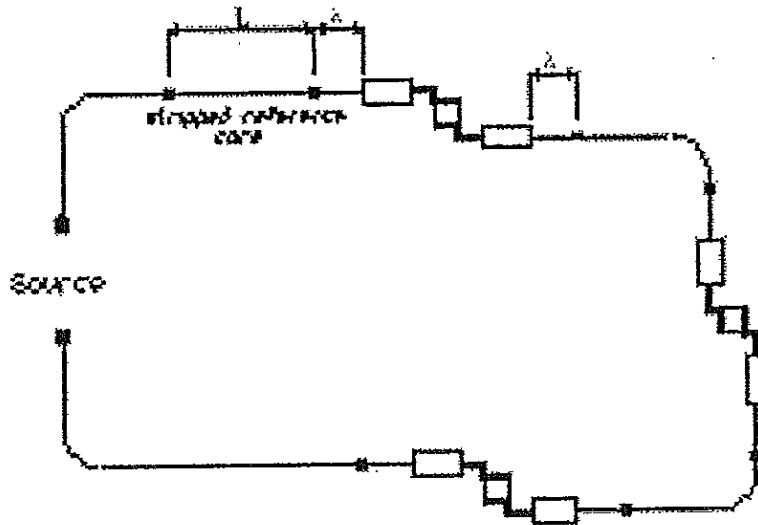
TEST EQUIPMENTS

- Measure equipment for traction / compression
- N° 2 and 3 electric ageing benches
- Measure stations NI1 and SA 70 N3
- Overcurrent bench
- Oscilloscope METRIX OX8627

PROCEDURES

Procedures and acceptance criteria are the ones of § 2.8 of standard NF C 33-021 dated June 1998 which refers to standard NF C 33-004 dated June 1998.

The test loop carried out according to standard NF C 33-004 is the loop "F" in "U" form :



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TEST DESCRIPTION: 2.8 Electric ageing test

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1. Preparation of the loop

- Parameters of the loop are calculated :

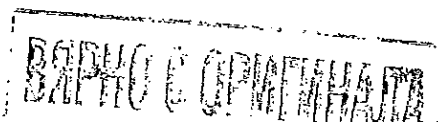
TYPE OF LUGS	λ	L
CPTAU 25	150mm	300mm
CPTAU 95	200mm	400mm

- Voltage measures are performed by means of equalizers (welding method : «TIG», metal filler : aluminium 1 050A). They are placed as indicated on the previous scheme.
- Conductors that come out of the lugs, as well as the reference conductor, are equipped with terminal lugs.
- The reference core is stripped.

2. Assembly of the loop

- Samples are fitted on cores stripped over the length indicated on the CPTAU lug. They are crimped with a pneumatic jack and adapted dies.
- So as to assure a good crimping of the preinsulated sleeves, we check that a 0,05 mm thick wedge does not go in.
- The linking palms of the CPTAU lugs are tightened on the spacers, two by two, with M10 bolts at 20N.m for CPTAU 25 and M12 bolts at 32N.m for CPTAU 95.
- Conductors equipped with terminal lugs are linked between each other, to the electric ageing bench by means of bolts.
- Voltage measure points are installed on the conductors equalizers and the 14mm thickness spacers.
- Temperature measure points are installed as follows :

	TYPE OF THERMOCOUPLE	PLACE OF FIXING	TYPE OF HOLD
CPTAU lug	- type «k», «sheathed» in a tube of inconel, - diameter 1 mm.	- at the place of the CPTAU lug crimping in a 1,2mm diameter hole, - in the copper linking palm of the lug close to the contact in a 1,2mm diameter hole.	- covered with «thermoconductor» grease - holding with a mastic type «polyurethane»
Reference core	- type «k», - diameter 0,5 mm.	- at the «middle» of the reference conductor core.	- holding through a splice (copper wire diameter 0,4mm) - covered with «thermoconductor» grease
Room temperature	- type «k», «sheathed» in a tube of inconel, - diameter 1 mm.	- at the middle of the loop in the horizontal level containing the lugs.	/



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TEST DESCRIPTION : 2.8 Electric ageing test

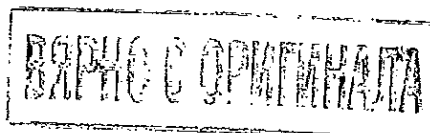
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3. Process of a cycle

		CPTAU 25	CPTAU 95
Heating at 120°C of the reference core	Duration	4 min	5 min
	Intensity	~ 200A	~ 500A
Step at 120°C of the reference core	Duration	50 min	55 min
	Intensity	~ 140A	~ 355A
Temperature measure every 10 cycle			
Cooling	Duration	30min	25min
Resistance measure every 10 cycle			
Total duration of a cycle	Duration	84min	85min

4. Performing of the test - Measures

- Resistance measure is performed under a direct current of 10A for lugs CPTAU 25 and 30A for lugs CPTAU 95, every 10 cycle.
- Rj resistance values of each lug are calculated according to § 5.3.3.4 of standard NF C 33-004 dated June 1998.
- The test is performed as follows :
 - ◆ for lugs CPTAU 25 : 200 cycles of electrical ageing,
 - ◆ for lugs CPTAU 95 :
 - * 50 cycles of electrical ageing,
 - * application of 4 overloads during 1 s with an intensity of 9 500A,
 - * 150 cycles of electrical ageing.



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TEST DESCRIPTION: 2.8 Electric ageing test

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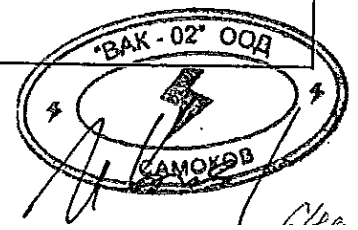
TEST RESULTS

Lug CPTAU 25

TEMPERATURE RECORD
(in °C)

Cycles	Reference core	Crimping of the lug						Room temperature
		7	8	9	10	11	12	
1	120,8	62,2	61,0	62,8	61,9	62,9	60,5	23,3
10	120,3	60,7	61,4	62,3	60,3	62,2	59,1	23,7
20	119,7	60,9	60,2	61,7	60,9	62,1	59,0	23,7
30	120,4	60,8	60,1	61,7	58,7	61,5	58,5	24,0
40	119,2	61,2	60,1	61,8	60,2	61,8	59,1	24,1
50	118,4	61,2	60,6	62,1	59,7	62,3	59,4	24,0
60	121,7	62,4	59,2	62,3	61,1	61,7	59,5	25,2
70	119,1	61,9	60,9	63,0	60,5	62,6	60,1	24,7
80	120,6	62,1	60,7	62,8	61,5	63,1	60,5	25,3
90	121,8	63,0	61,0	63,5	63,6	63,8	60,5	24,8
100	120,6	62,4	60,3	64,0	61,8	62,8	60,2	24,2
110	121,5	63,2	61,4	64,6	63,2	64,4	60,6	24,4
120	120,9	61,9	59,1	63,1	59,6	61,5	60,2	23,7
130	120,9	61,8	59,6	62,7	61,4	62,5	59,9	24,5
140	120,6	63,1	60,4	63,3	61,2	63,0	60,9	25,1
150	119,0	62,2	59,7	62,9	61,3	63,9	60,8	25,3
160	119,4	63,0	59,7	62,9	60,8	62,6	60,7	25,3
170	120,6	62,1	58,7	62,5	62,2	63,7	60,9	25,2
180	121,1	62,3	58,1	62,9	62,0	63,3	59,9	25,3
190	121,4	61,8	56,5	60,5	59,7	60,8	58,8	24,3
200	118,3	61,0	57,5	59,8	60,4	60,9	58,4	24,4

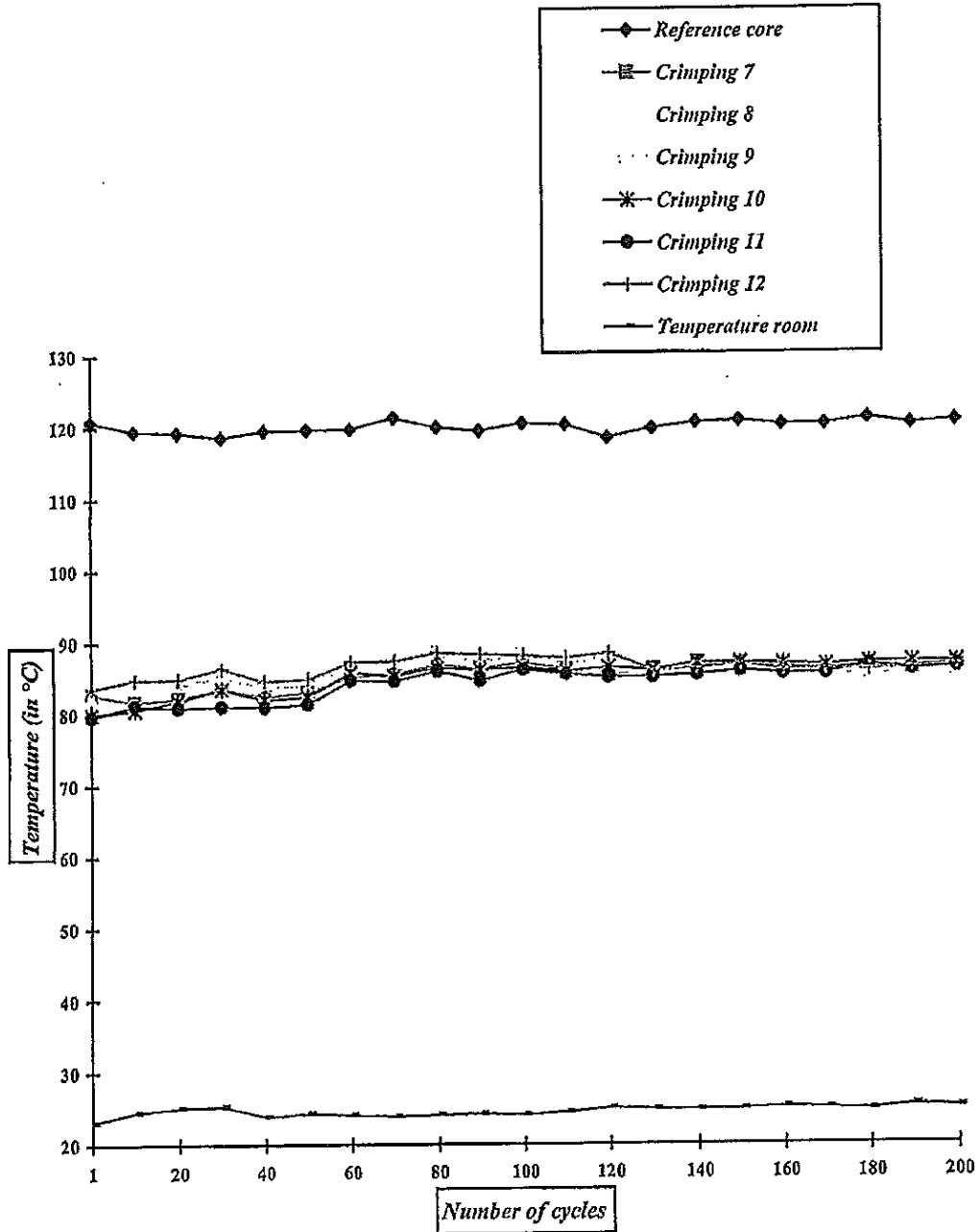
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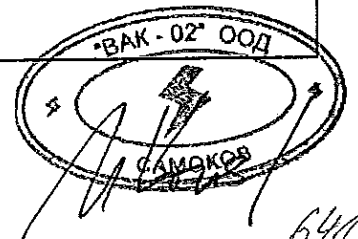
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TEST DESCRIPTION: 2.8 Electric ageing test

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ВАРНИК С ОПИШТАВАТА



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TEST DESCRIPTION : 2.8 Electric ageing test

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Lug CPTAU 25

TEMPERATURE RECORD
(in °C)

Cycles	Reference core	Copper linking palm of the lug						Room temperature
		7	8	9	10	11	12	
1	120,8	64,3	65,2	62,3	62,9	64,9	64,4	23,3
10	120,3	64,8	66,7	64,3	63,1	63,8	62,9	23,7
20	119,7	65,4	67,2	65,2	63,8	65,0	63,3	23,7
30	120,4	65,8	67,4	65,6	64,1	65,0	63,7	24,0
40	119,2	66,4	68,6	66,3	64,7	65,7	64,9	24,1
50	118,4	66,7	69,4	67,3	66,5	67,3	66,0	24,0
60	121,7	66,3	67,9	65,6	64,2	64,8	65,4	25,2
70	119,1	65,3	66,3	64,9	63,6	63,3	64,9	24,7
80	120,6	63,7	65,1	64,0	62,2	62,7	62,6	25,3
90	121,8	65,6	67,0	65,3	63,5	63,5	64,6	24,8
100	120,6	64,6	67,4	64,4	63,5	62,9	63,8	24,2
110	121,5	64,2	65,8	64,0	62,6	62,9	63,3	24,4
120	120,9	65,8	67,1	66,1	63,7	64,6	64,8	23,7
130	120,9	64,7	66,9	64,6	63,2	62,8	63,3	24,5
140	120,6	64,6	67,5	65,0	63,7	64,6	64,1	25,1
150	119,0	65,2	67,8	65,4	63,9	65,2	64,6	25,3
160	119,4	66,0	68,3	65,7	64,7	65,8	65,4	25,3
170	120,6	65,6	67,8	65,5	64,1	65,3	64,3	25,2
180	121,1	65,2	66,3	64,2	64,1	63,9	64,4	25,3
190	121,4	65,3	66,7	64,7	63,8	64,4	64,4	24,3
200	118,3	65,0	66,1	63,7	62,8	63,9	64,1	24,4

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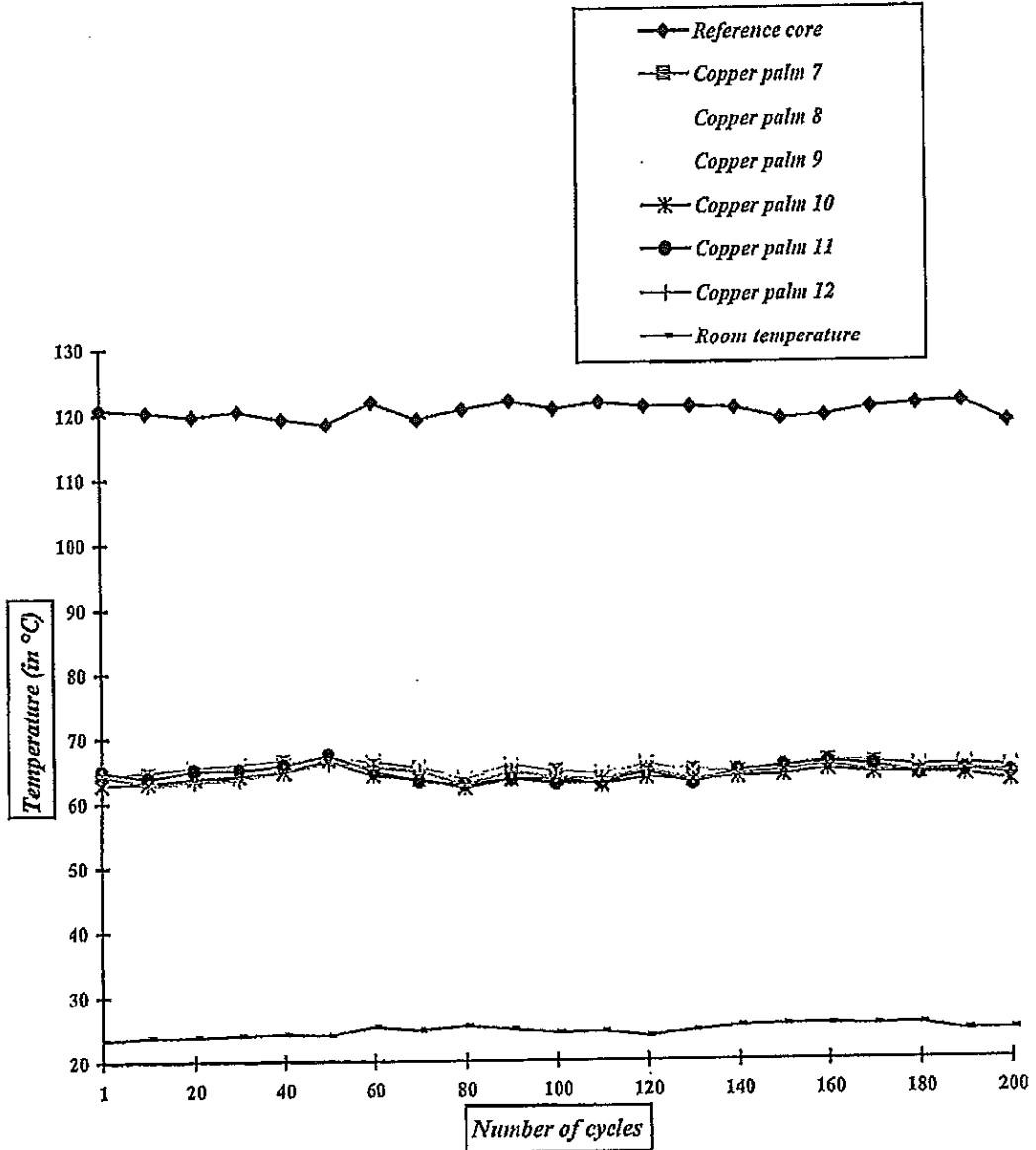


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TEST DESCRIPTION : 2.8 Electric ageing test

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ВЪРНО С ОРИГИНАЛА

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TEST DESCRIPTION: 2.8 Electric ageing test

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Lug CPTAU 95

TEMPERATURE RECORD
(in °C)

Cycles	Reference core	Crimping of the lug						Room temperature
		9	10	11	12	13	14	
1	120,3	75,0	74,8	73,4	71,1	73,4	73,9	23,6
10	119,2	76,9	76,5	76,2	74,4	74,8	76,9	24,8
20	120,5	76,1	76,0	76,1	72,9	74,5	75,9	23,6
30	118,4	76,4	75,7	76,5	73,8	75,5	76,4	24,2
40	119,8	75,5	75,6	76,4	73,2	74,6	75,0	23,1
50	119,4	76,6	76,4	77,2	74,0	75,8	76,8	23,2
60	120,8	78,6	77,8	78,5	74,4	77,5	78,9	22,7
70	118,8	77,8	77,0	78,5	74,9	77,0	78,5	22,6
80	120,3	78,2	77,8	77,8	73,3	76,7	78,0	22,9
90	119,5	78,8	78,2	80,1	75,3	78,6	79,6	22,4
100	119,5	77,6	77,7	77,7	73,0	76,4	77,5	23,8
110	119,2	78,2	78,7	79,8	74,7	78,3	78,6	22,8
120	120,2	78,4	76,8	78,0	73,6	76,4	77,3	23,7
130	119,5	78,5	78,7	79,6	74,6	78,1	78,1	23,0
140	120,8	78,9	79,5	79,7	75,8	79,3	79,1	24,1
150	120,5	78,8	77,2	77,9	73,4	76,7	77,8	24,0
160	120,3	78,9	78,2	80,1	74,7	79,1	78,3	22,8
170	119,8	79,9	78,0	80,5	75,3	78,6	79,5	22,0
180	119,8	79,4	77,3	79,9	74,6	77,9	79,0	21,7
190	120,2	79,2	77,6	79,2	73,8	77,1	78,7	22,0
200	119,8	78,2	77,7	79,5	74,0	77,0	78,5	22,3



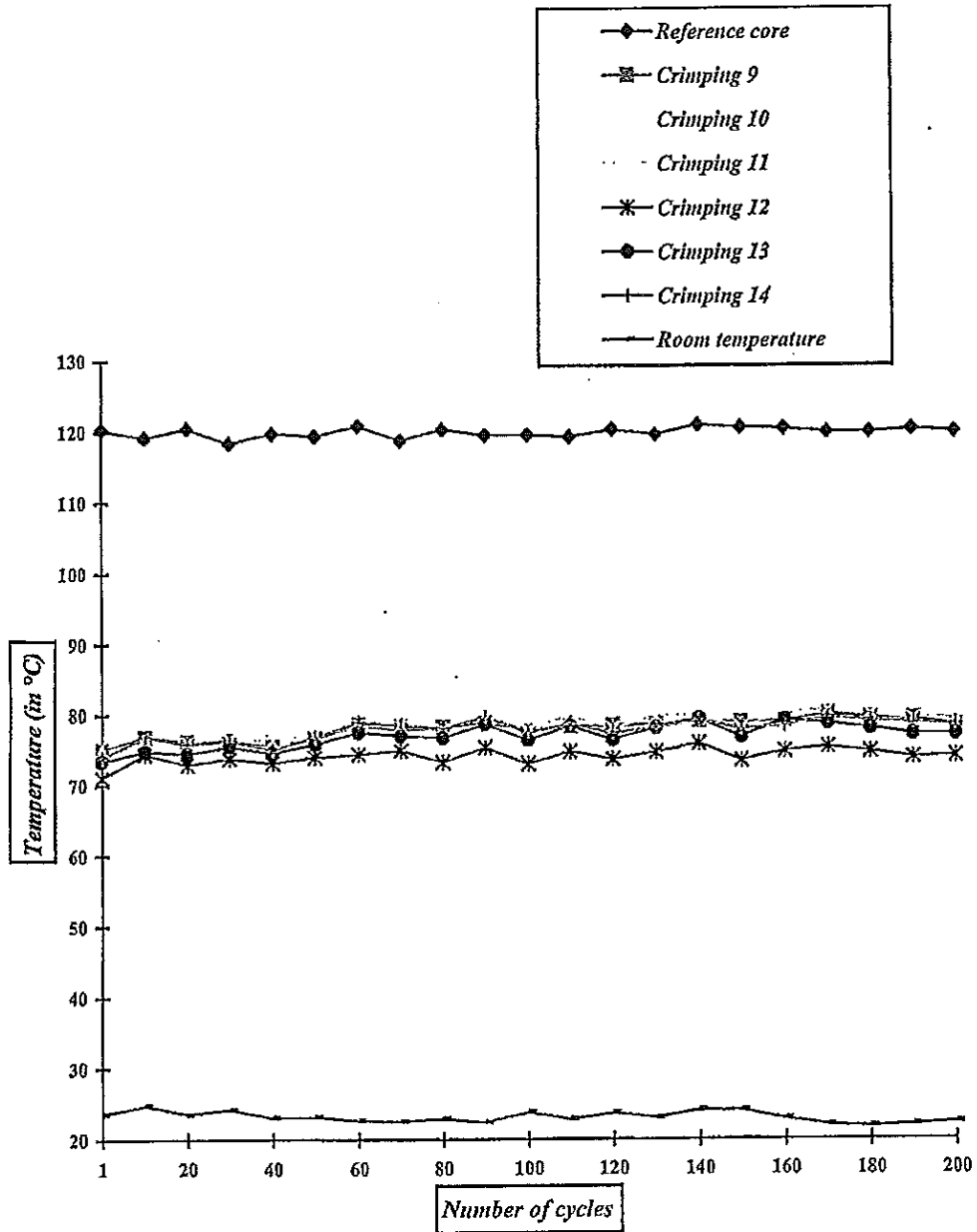
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TEST DESCRIPTION : 2.8 Electric ageing test

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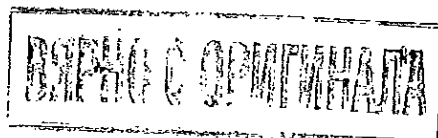
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Lug CPTAU 95

TEMPERATURE RECORD
(in °C)

Cycles	Reference core	Copper linking palm of the lug						Room temperature
		9	10	11	12	13	14	
1	120,3	82,4	81,3	81,7	79,3	80,9	80,5	23,6
10	119,2	82,1	80,9	83,8	82,8	81,2	81,3	24,8
20	120,5	83,9	82,5	84,4	84,5	82,5	83,2	23,6
30	118,4	79,3	78,1	81,1	79,6	78,5	77,9	24,2
40	119,8	82,0	81,0	80,8	83,3	82,7	83,2	23,1
50	119,4	81,9	81,3	80,1	81,5	82,5	83,0	23,2
60	120,8	82,3	80,3	81,6	83,9	83,0	82,7	22,7
70	118,8	79,3	77,8	82,1	79,9	79,1	79,3	22,6
80	120,3	80,2	78,9	83,6	81,8	80,3	80,6	22,9
90	119,5	79,9	79,4	83,0	81,1	79,6	80,4	22,4
100	119,5	82,3	80,3	82,0	81,7	80,0	80,4	23,8
110	119,2	80,7	79,5	81,4	80,3	79,5	79,8	22,8
120	120,2	78,8	78,2	82,2	81,1	79,3	80,8	23,7
130	119,5	80,9	80,0	82,4	81,7	80,6	80,4	23,0
140	120,8	80,4	79,6	83,6	81,7	80,1	80,1	24,1
150	120,5	81,1	79,8	83,9	82,6	80,7	80,9	24,0
160	120,3	81,5	80,3	83,0	81,7	79,8	80,4	22,8
170	119,8	81,5	81,8	82,2	82,8	80,8	80,9	22,0
180	119,8	80,5	78,8	82,0	81,4	80,0	79,7	21,7
190	120,2	80,6	79,5	83,3	80,7	80,1	79,3	22,0
200	119,8	81,3	81,1	83,8	82,1	80,4	80,7	22,3



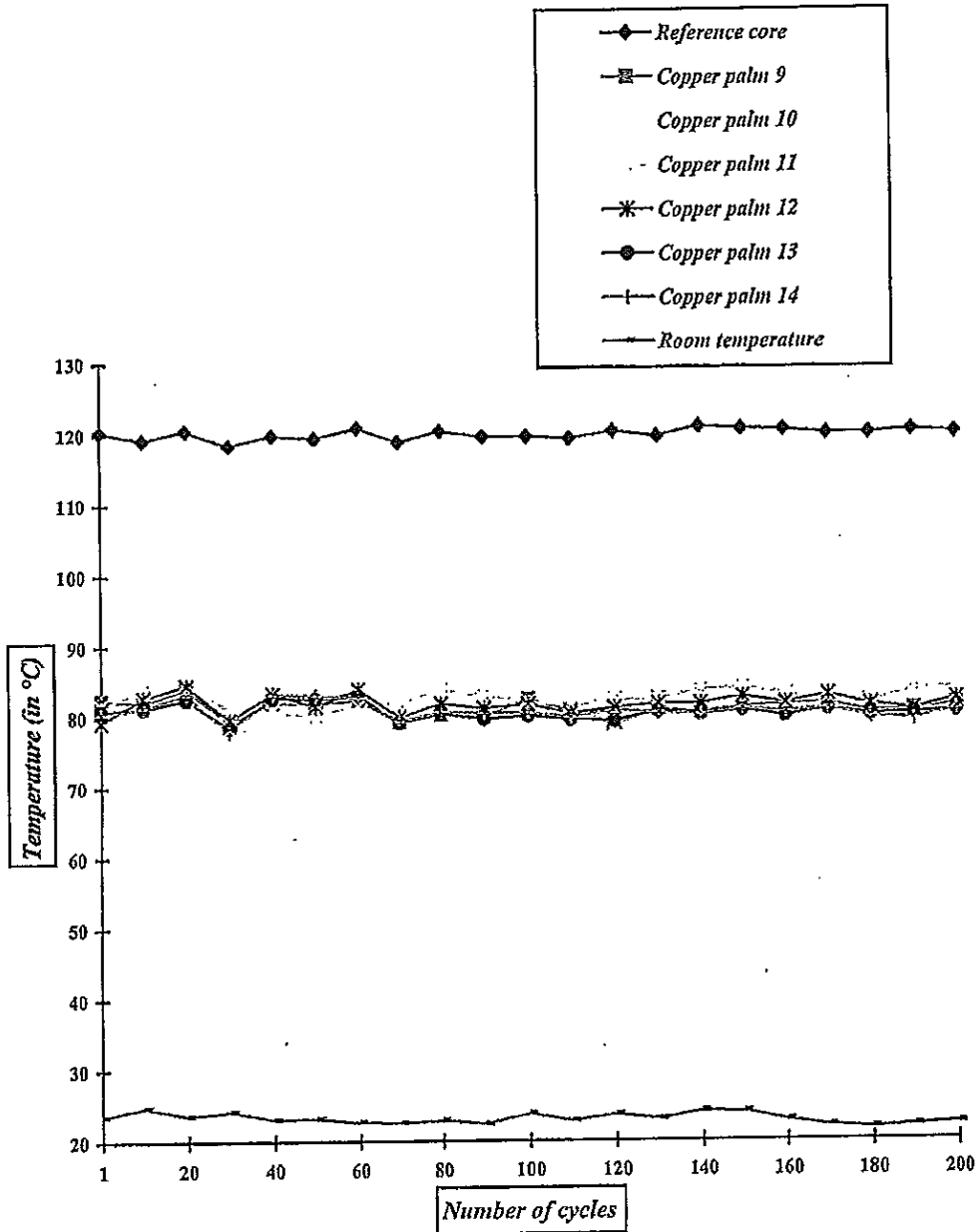
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TEST DESCRIPTION: 2.8 Electric ageing test

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ВАРНО С ОРМЕТНАТА



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TEST REPORT
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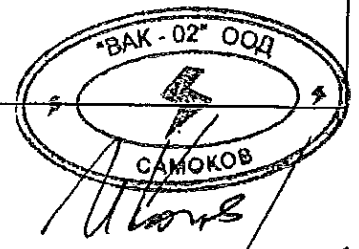
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Lug CPTAU 25

Rj RESISTANCE RECORD (in $\mu\Omega$)

Cycles	Lug					
	7	8	9	10	11	12
0	69,4	72,9	71,0	73,2	68,6	72,3
10	81,2	83,6	83,7	81,6	78,6	83,8
20	84,7	85,9	85,8	83,4	80,4	86,1
30	86,9	87,4	87,5	85,3	82,3	88,2
40	88,7	89,1	89,6	86,5	83,7	89,9
50	90,3	90,5	90,8	87,5	84,9	91,3
60	91,2	91,2	91,5	88,2	86,0	92,3
70	92,1	91,9	92,4	89,1	86,8	93,1
80	92,8	92,6	93,1	89,9	87,5	93,8
90	93,4	93,1	93,7	90,4	88,3	94,6
100	93,8	93,7	94,2	91,0	88,7	95,1
110	94,0	94,3	94,6	91,5	89,2	95,7
120	94,4	94,8	94,9	91,8	89,6	96,2
130	94,9	95,1	95,5	92,3	89,8	96,4
140	94,7	95,4	95,9	92,4	90,1	96,7
150	95,0	95,8	96,1	93,0	90,3	96,8
160	95,2	95,7	96,2	93,2	90,7	97,0
170	95,3	96,2	96,4	93,4	91,0	97,2
180	95,6	96,5	96,6	93,5	91,2	97,4
190	95,7	96,5	96,7	93,6	91,4	97,4
200	95,4	96,7	96,6	93,6	91,3	97,5

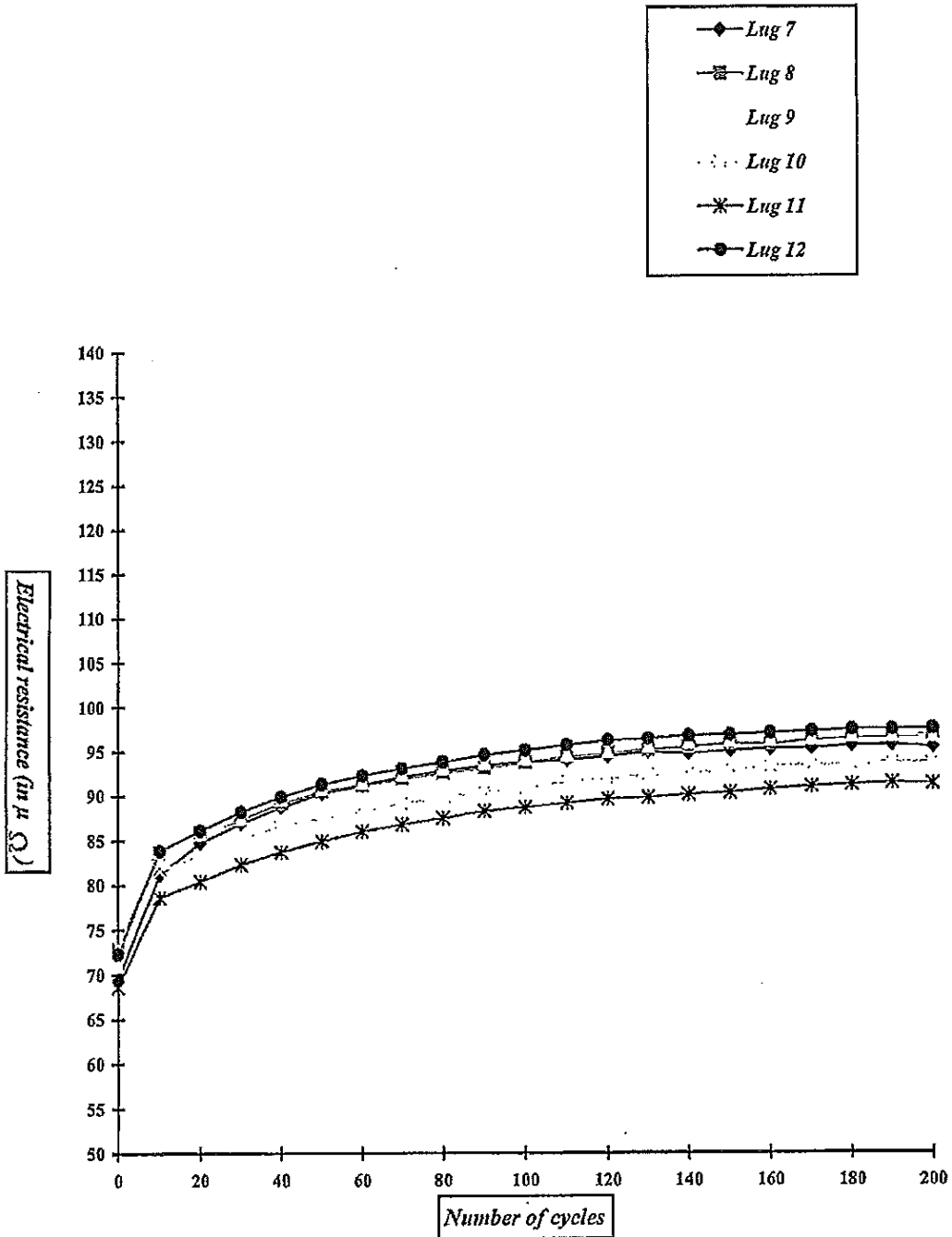
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TEST DESCRIPTION: 2.8 Electric ageing test

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ВАРНО С ОРГАНИЗАТА



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TEST DESCRIPTION : 2.8. Electric ageing test.

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Lug CPTAU 95

Rj RESISTANCE RECORD
(in $\mu\Omega$)

Cycles	Lug					
	9	10	11	12	13	14
0	60,3	63,8	66,7	68,2	64,6	61,6
10	68,4	73,5	75,1	74,3	72,5	67,9
20	72,1	76,6	78,3	76,1	75,6	70,3
30	74,7	78,9	80,5	78,2	78,1	72,5
40	76,2	81,3	82,4	79,7	80,3	74,6
50 before overloads	77,6	83,0	83,9	80,8	81,9	75,9
50 after overloads	79,7	84,8	86,0	83,1	83,2	78,1
60	80,5	85,2	87,0	83,6	84,1	79,1
70	81,0	86,1	88,3	84,3	85,0	79,7
80	81,7	87,0	89,4	84,7	85,9	80,2
90	82,4	87,9	90,1	85,4	86,6	80,6
100	82,8	88,4	90,9	86,0	87,2	81,2
110	83,4	89,1	91,7	86,3	87,6	81,5
120	83,7	89,6	92,4	86,5	88,1	81,8
130	84,1	90,0	93,0	86,7	88,4	82,3
140	84,3	90,5	93,4	87,0	88,8	82,6
150	84,4	90,7	93,8	87,1	89,2	82,8
160	84,7	91,0	94,2	87,4	89,4	82,8
170	85,0	91,2	94,5	87,6	89,7	83,1
180	85,0	91,3	94,8	87,7	89,7	83,4
190	85,1	91,6	94,9	87,9	89,9	83,6
200	85,3	91,9	94,9	88,0	90,1	83,6



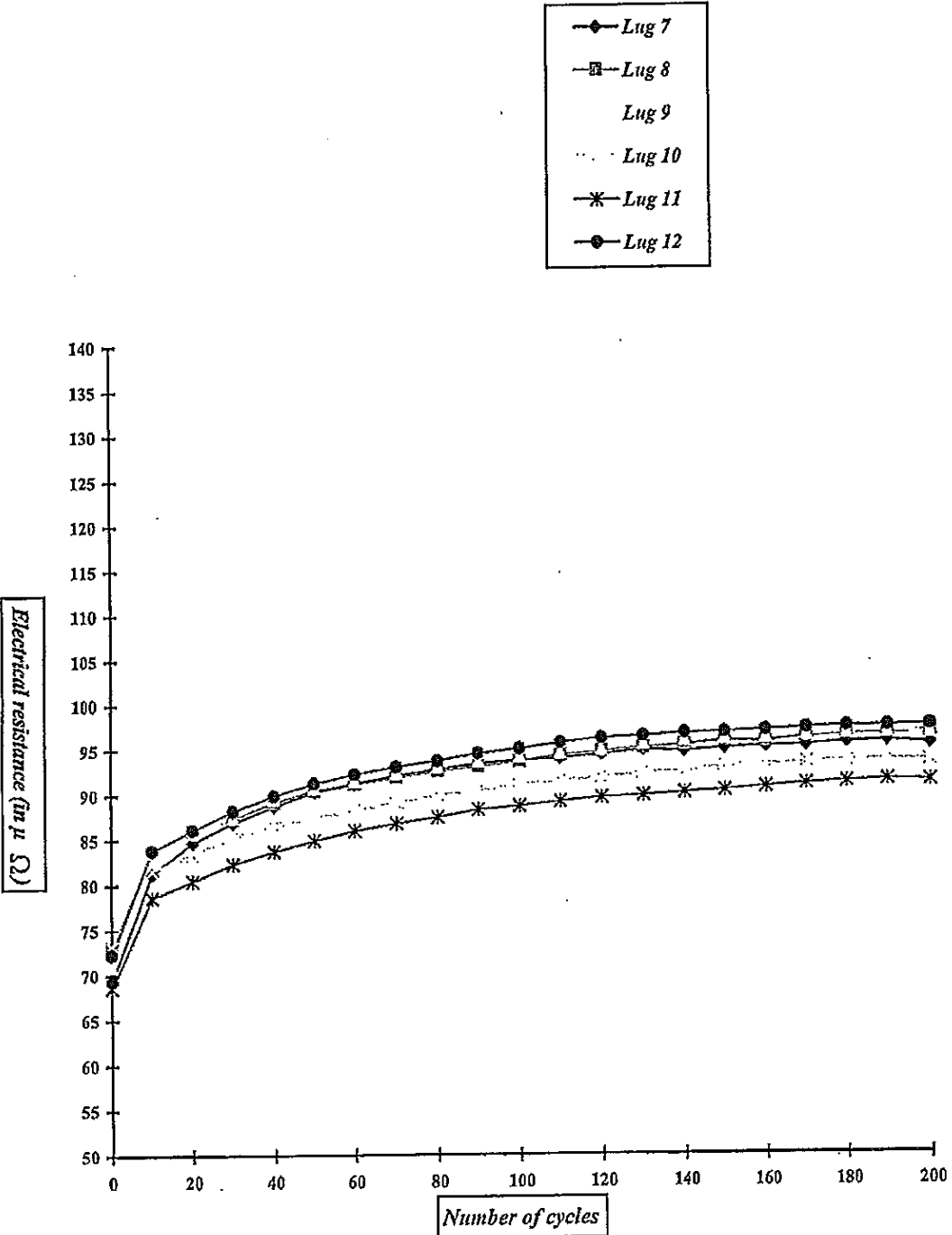
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TEST DESCRIPTION: 2.8 Electric ageing test

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ВЕРНО С ОРИГИНАЛАТА

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TEST DESCRIPTION : 2.8 Electric ageing test

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The results are the ones of § 5.4 of standard NF C 33-004 which defines the following acceptance criteria :

- ◊ Relative initial scatter of resistances : $\delta \leq 0,30$
- ◊ Stability of resistances R_j (on the 11th last measures) : $\frac{\Delta R_j}{R_j} \leq 12\%$
- ◊ Stability of temperatures θ_j (on the 11th last measures) :
 $d_j - 10 \leq d_j \leq d_j + 10$ with : * $d_j = \theta_R - \theta_j$
 * θ_R : temperature of the warmest reference core
 $\theta_j \leq \text{Max } \theta_R$
 Equivalent to check : $\text{Min } d_j \geq 0$

1) Temperature

TYPE OF LUGS	POSITION OF THERMOCOUPLE	SAMPLE N°	TEMPERATURE STABILITY (IN K)			
			$\bar{d}_j - 10$	Min d_j	Max d_j	$\bar{d}_j + 10$
CPTAU 25	Crimping of the lug	7	48,1	56,4	59,6	68,1
		8	51,2	59,3	64,9	71,2
		9	47,7	56,1	60,9	67,7
		10	49,2	57,7	61,7	69,2
		11	47,7	55,1	60,6	67,7
		12	50,3	58,2	62,6	70,3
	Copper linking palm	7	45,3	53,3	57,3	65,3
		8	43,3	51,1	55,7	63,3
		9	45,5	53,6	57,5	65,5
		10	46,7	54,7	58,9	66,7
		11	46,2	53,6	58,6	66,2
		12	46,2	54,0	58,2	66,2
CPTAU 95	Crimping of the lug	9	31,2	39,9	41,9	51,2
		10	32,0	40,5	43,4	52,0
		11	30,7	39,3	42,6	50,7
		12	35,6	44,5	47,1	55,6
		13	32,2	40,9	43,8	52,2
		14	31,6	40,3	42,9	51,6
		Copper linking palm	9	29,1	37,2	41,4
	10		30,1	38,0	42,0	50,1
	11		27,3	36,0	38,0	47,3
	12		28,3	37,0	39,5	48,3
	13		29,8	38,9	40,9	49,8
	14		29,7	38,9	40,9	49,7



ВЫПИСЬ С ОПРИЯТНОСТЯ

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TEST DESCRIPTION: 2.8. Electric ageing test

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2) Resistance

TYPE OF LUGS	SAMPLE N°	INITIAL SCATTER δ	RESISTANCE STABILITY (in %)	$\frac{\Delta R_j}{R_j}$
CPTAU 25	7	0,044	2,0	
	8		3,1	
	9		2,6	
	10		2,8	
	11		3,0	
	12		2,5	
CPTAU 95	9	0,077	3,0	
	10		3,9	
	11		4,3	
	12		2,3	
	13		3,3	
	14		2,9	




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**СПИСЪК НА ОТДЕЛНИТЕ ИЗПИТВАНИЯ ЗА ИЗОЛИРАНИ ПРЕСОВИ
НАКРАЙНИЦИ ТИПОВЕ К 159, К 160, К 163, К 164, К165, К166 и К 167**

1. № на тест: 130-06-03-03

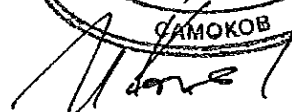
2.3.2 Механичен тест – Тест за якост на опън.....	5
2.4 Диелектричен тест и тест за водонепропускливост.....	7
2.6 Тест за стареене под въздействието на климатичните условия.....	9
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На основание чл. 2
от ЗЗЛД

Състави







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Direction Etudes et Recherches

Test report : Effect of tightening on the
 mechanical strength of the main core
 Test number : 04 04 780
 Product brand : SICAME
 Product type : TTD 371 FTA

Demandeur of the test : DER
 Starting date of the test : 05/04/2004
 Report emission date : 07 AVR. 2004
 According to standard : NF C 33-020 (June 98) §2.3.2
 This report contains : 3 pages

Conclusion : The tested SICAME LV insulation piercing connectors type TTD 371 FTA conform to the requirement of NF C 33-020 (June 98) §2.3.2.

This is an English translation. The original French test report is the only reference version

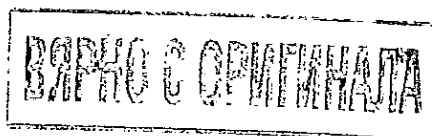
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Accreditation 1-1068. Scope on request.
 The Cofrac testing station accreditation is issued to the company which has qualified.
 This report applies only to the products as listed above. With the authorization of Sicame S.A., this report may only be reproduced in its totality.

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ACCREDITATION
 N° 1-1068
 PORTEE
 COMMISSION
 SUR DEMANDE



GT

1 Equipment used during test**1.1 Equipment used :**

N°UT	Designation	Characteristic
98 01 86	Electronic torque wrench ETW25	Precision 4%
94 03 10	Traction bench 3 tonnes	Class 1

1.2 Cables

	Main core	Main core	tap core
Section	50	150	95
Nature	Aluminium	Aluminium	Aluminium
Requirements	NF C 33-209	NF C 33-209	UNE 21-030-92
From	France	France	Spain
Identification n°	4001	9990	011102
Conditioned on	The 05/04/2004 (1h at 120°C)	The 05/04/2004 (1h at 120°C)	The 01/03/2004 (1h at 120°C)

2 Product tested

Designation : TTD 371FTA
Quantity : 4
Batch number : 03M257120
Identification : 1 and 2 for 50 mm² cross-section
3 and 4 for 150 mm² cross-section
Reception date : At the laboratory on the 05/04/2004

На основание чл. 2
от ЗЗЛД

ВЯРНО С ОПРИМНАТА

3 Test

Connectors are tested according to NF C 33-020 (June 98) §2.3.2.

3.1 Procedure

The connectors are installed on the smallest and the largest cross-sections for the main core and the largest cross-section for the tap core.

The connector are located at the center of the main core, secured between two anchorages 0,5 m to 1,5 m apart.

The connector is tightened on the main core stretch to 20 % of the indicated in the standard NF C 33-020 (June 98) §2.3.2 up to the maximum torque indicated by manufacturer.

An increasing tensile stress is applied to the conductor of the main core, at a rate between 1 000 N/min and 5 000 N/min up to the value indicated in the standard NF C 33-020 (June 98) §2.3.2. Strength is maintained for one minute.

3.2 Preparation

The 1 and 2 connectors are installed on 50 mm² cross-section for the main core. The connector is tightened on the main core stretch to 20% of 3500 N that is 700 N

The 3 and 4 connectors are installed on 150 mm² cross-section for the main core. The connector is tightened on the main core stretch to 20% of 10500 N that is 2100 N

4 Results

	Standard requirements	Results
Ambient temperature and humidity conditions	Between 15 and 35°C Between 25 % and 75 % HR	21°C 36% HR
Torque (Nm)	Maximum torque : 16	Connector 1 : 16 - 16 Connector 2 : 16 - 16 Connector 3 : 16 - 16 Connector 4 : 16 - 16
Rate of the tensile (N/min)	Between 1000 and 5000	3000
Stress maintained for one min (N)	For 50 mm ² : 3500 0 +5 % For 150 mm ² : 10500 0 +5 %	Connector 1 : Min 3538,7 – Max 3602,1 Connector 2 : Min 3561,2 – Max 3596,5 Connector 3 : Min 10715,0 – Max 10774,0 Connector 4 : Min 10704,0 – Max 10774,0

5 Requirement

No breakdown of the core conductor is observed throughout the application of the load.

На основание чл. 2
от ЗЗЛД

ВЪРНИТЕ С ОПРЕДЕЛЕНИЯТА

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**СПИСЪК НА ОТДЕЛНИТЕ ИЗПИТВАНИЯ НА ИЗОЛИРАНА КЛЕМА
ТИП TTD 371 FTA**

1. № на тест: 0404780 - Влияние на затягането върху механичната якост на главния проводник.

Съставил:

На основание чл. 2
от ЗЗЛД



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Direction études et recherches

TEST REPORT : Dielectric test.

PRODUCT: LV insulation piercing connectors.

Test report	: Dielectric test
Report number	: 9810341
Product brand	: SICAME
Product type	: TTD201AFA
Project n°	: E 0170110

Demander of the test: SICAME DER

Starting date of the test : 21/10/1998

Report emission date : 19/02/1999

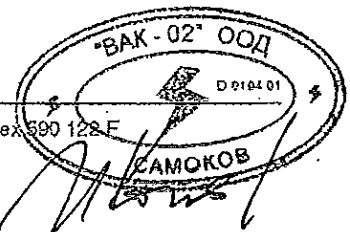
According to standard : NF C 33-020 (06/1998)

This report contains : 3 Pages - 0 Annexe(s)

Conclusion : The SICAME LV insulation piercing connectors type TTD201AFA conform to standard NF C 33-020 (06/1998) sub-clause 2.4.

На основание чл. 2
от ЗЗЛД

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SICAME DER	DIELECTRIC AND WATERTIGHT TEST ACCORDING TO SPECIFICATION : NF C 33-020	SUP ER 560 INDICE A
---------------	--	------------------------

Test number : 9810341 Date: 21/10/1998 Ambient Temperature : 22.3 °C
 Product brand : SICAME Humidity : 36 %
 Product type : TTD201AFA

A - Computer equipment

IBM PS2 (Inv N°: 88 93 06) Hard disk 115 MB
 Analog/Digital interface card
 Digital/Analog interface card
 Disk Operating System: DOS 6.1 IBM

IBM 4029 020 (Inv N°: 92 03 30) Laser printer

B - Equipment for Dielectric test

Dielectric unit (Inv N° : 91 02 69) BOUCHET

Dielectric unit (Inv N° : 84 01 08)

C - General Equipment

Digital vernier (Inv N°: 93 06 07) MITUTOYO

Electronic Torque wrench (Inv N°: 98 01 26)

Calibrated Ruler (Inv N°: 95 01 75) ROCH

Stopwatch (Inv N°: 92 02 82) HANHART

ВАРНО С ОРМТИВАТА

На основание чл. 2
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SICAME	DIELECTRIC AND WATERTIGHT TEST	SUP ER 560
DER	ACCORDING TO SPECIFICATION : NF C 33-020	INDICE A

Test number : 9810341 Date: 21/10/1998 Ambient Temperature : 22.3 °C
 Product brand : SICAME Humidity : 36 %
 Product type : TTD201AFA

A- Test Procedure

The conductors are bend to the correct shape prior to fitting the connectors. The connector is tightened up to the minimum torque indicated by the manufacturer. The connectors are mounted on the minimum and maximum cross-section for main cores and minimum cross-section for tap cores.

The assembly is placed in the bottom of water tank, the water level must be 30 cm above the uppermost part of the connector. After 30 min under the water, the voltage test is applied to the sample with a 6 kV a.c. voltage for 1 min (50 Hz).

The potential difference is applied to a rate of 1 kV/s. The voltage generator shall trigger for a leakage current of (10.0±0.5) mA.

B- Results

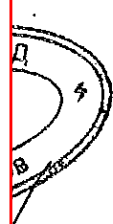
CONNECTOR N°	Cable sizes used (mm ²)		Torque Values (Nm)		
	Main	Tap	Main	Tap 1	Tap 2
1	35	25	16.5	/	/
2	35	25	16.5	/	/
3	70	25	16.5	/	/
4	70	25	16.5	/	/
N° CONNECTOR	6kV/1mn After 30 min in water	Triggering value with I=10mA (KV)	OBSERVATIONS		
1	OK	8.1			
2	OK	7.9			
3	OK	15.4			
4	OK	15.9			

Generals observations:

* Every measurement and observation conforms to the standard requirements.

Sup

На основание чл. 2 от ЗЗЛД



ВАРНО С ОПИТИВАТА

661

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Direction études et recherches

TEST REPORT : ELECTRICAL AGEING TEST

PRODUCT: Low voltage insulating piercing connectors

Report number	: 9509031
Product brand	: SICAME
Product type	: TTD 201 AFA
Project number	: E 0170110
Production lot numb:	95S30710

Demander of the test : SICAME DER
Starting date of the test : 31/08/1995
Report emission date : 17/03/1997
According to standard : HN 33 E 61 AUGUST 85

This report contains : 8 Pages - Annexe(s)

Conclusion : The low voltage insulation piercing connectors by SICAME type TTD 201 AFA conform to the standard HN 33 E 61 of August 1985.

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от ЗЗЛД

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ВАРНО С ОРНИНАТА



SICAME	EQUIPEMENT USED DURING ELECTRICAL	SUP ER 1130
DER	AGEING TEST STANDARD : HN 33 E 61	INDEX A

Test number : 9509031
 Product brand : SICAME
 Product type : TTD 201 AFA

A - Computer

IBM PS2 N'UT : 88 93 06 Hard disc 115 MEGABYTES
 Analogical / digital card
 Digital / Analogical card
 DOS 6.1 IBM System used

IBM 4029 020 N'UT : 92 03 30 laser printer

B - Electrical ageing machines

N'5 N'UT : 94 04 27

Transformer 1200A/7V or 1200A/10V thyristor units used for the primary transformers. Thermal regulation by eurotherm. 0.5 % indicator accuracy of the full scale at the point of prescription. Program planner cycles : 1 second. Minimum accuracy : 1 min programming. Stabilised continuous current source - SAEME - 0 to 30 Amps measured by shunt 3.3 Megaohms. Current adaptator except n' 3

C - Electrical and thermal measurements machines

Scanner N'2 N'UT : 91 03 32

Temperature scanners - COLE PARMER -
 - 12 tracks, Constant copper thermocouples (type T). Scale used : - 200 to + 300° C, 1° C accuracy.

Numeric calibrator N'UT : 88 05 14 AOIP JN 5303B (tension drop)

Buzzer SICAME N'UT : 92 04 20

Short-circuit machine N'UT : 79 00 59 MEROT SODEX
 Intensity transformer report : 25000/5 A
 Precision rating : 15 VA Class 0.5
 Secondday monophasil transformer : 40 V / 20000 A RMS during 1 s.

D - Other materials

Digital slide caliper ruler N' UT : 93 06 07 MITUTOYO

Electronic torque wrench N'UT : 92 03 31 POWELL DUFFRYN
 Accuracy 1%

На основании чл. 2
 от 33ПД

SICAME	ELECTRIC AGEING TEST FOLLOWING STANDARD HN33E61	SUPER 620
DER	ON SICAME CONNECTORS TYPE TTD201AFA	INDICE A

TEST : 9509031

DATE : 31/08/95

A - TERMS AND CONDITIONS OF THE TEST

Installation of testing bench

The testing bench is arranged in the interior in one local sealed from air, in such a way that the ageing test takes place in a calm atmosphere.

The following minimal distances are to be observed :

- between 2 parallel conductors : 20 cm;
- between any conductor and any vertical wall of the local : 30 cm;
- between the horizontal plane of the coupling of one part and the horizontal walls of another part of the local : 60 cm.

B - SETTING OF THE TEST

The loop of the test is formed by four identical groups comprised of one conductor of center cable S1, one conductor of core section S2.

S1: 95 mm² AluS2: 95 mm² AluS1: Diam. over cent. Cable: 11.6 mm Diam. over sheath : 15.6 mm
Nb of theath : 19S2: Diam. over cent. cable: 11.6 mm Diam. over sheath : 15.6 mm
Nb of theath : 19

The tightening torque is Nm on main and Nm on tap.
Test following standard HN33E61

C - REFERENCE LENGTH CALCULUS

The loop of the test is formed by a reference conductor of L' length of the center cable S2 : 95mm²Alu .

L1 = 263 mm L2 = 263 mm h = 50 mm

Theoretical reference length L' = 576 mm

Potential plugs

Each coupling is mounted between two potential plugs, wich are welded, and are necessary to the measures of resistance.
The potential plugs are placed by lambda distance, reckoned up to the ends of the coupling.

Main lambda = 200 mm Tap lambda = 200 mm

На основании чл. 2
от 33ЛД

ВАПТЮ С УЕ МП ПИМЕНЯМ

ELECTRIC AGEING TEST				TEST NUMBER: 9509031		
CONNECTOR SICAME TYPE TTD201AFA				STANDARD: HN33E61		
NUMBER OF CONNECTORS TESTED : 4				MAIN CABLE SECTION : 95mm ² Alu		
CONNECTOR 1				TAP CABLE SECTION : 95mm ² Alu		
				NUMBER OF CYCLES REQUIRED:200		
N' CYCLE	T AMB (°C)	T REF (°C)	T RAC (°C)	R0 E-6 Ohm	R E-6 Ohm	K
0	21.5	120.2	58.6	179.023	147.327	0.823
25	22.0	120.5	60.2	179.496	151.616	0.845
50	21.8	120.6	61.2	179.547	153.008	0.852
4 SHORTS CIRCUITS OF 9500 A/ 1 s -POWER				90250000.000		
50	21.9	120.5	60.5	179.736	151.051	0.840
80	22.3	120.1	61.2	179.176	152.785	0.853
135	22.0	120.5	62.2	179.255	153.738	0.858
165	22.4	120.6	62.5	179.526	154.820	0.862
200	22.3	120.4	62.6	179.465	155.809	0.868

TEST RESULTS :

- K; VALUE LESS THEN 1
- CONNECTOR TEMPERATURE LOWER THEN TEMPERATURE OF REFERENCE CABLE
- $DK = K(50) - K(50) = 0.012$ LESS THEN 0.05
- $DK = K(200) - K(50) = 0.028$ LESS THEN 0.05
- $DT = T(200) - T(50) = 2.1$ LESS THEN 10 °C

LEGEND :

- T AMB °C ---> AMBIENT TEMPERATURE IN °C
- T REF °C ---> REFERENCE CABLE TEMPERATURE IN °C
- T RAC °C ---> CONNECTOR TEMPERATURE DURING HEATING CYCLE IN °C
- R0 E-6 OHM ---> RESISTANCE OF REFERENCE CABLE AT 20°C (MILLI-OHM)
- R E-6 OHM ---> RESISTANCE OF CONNECTOR AT 20°C (MILLI-OHM)
- K ---> COEFFICIENT OF R/R0

SUP ER 360
INDEX A

На основании чл. 2
от ЗЗЛД

ИЗДАНИЕ 01.01.2011

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ELECTRIC AGEING TEST				TEST NUMBER: 9509031		
SICAME CONNECTOR TYPE TTD201AFA				STANDARD HN33E61		
NUMBER OF CONNECTOR TESTED: 4				MAIN CABLE SECTION : 95mm ² Alu		
CONNECTOR 2				TAP CABLE SECTION : 95mm ² Alu		
				NUMBER OF CYCLES REQUIRED: 200		
N° CYCLE	T AMB (°C)	T REF (°C)	T RAC (°C)	R0 E-6 Ohm	R E-6 Ohm	K
0	21.5	120.2	55.5	179.023	142.800	0.798
25	22.0	120.5	58.8	179.496	143.886	0.802
50	21.8	120.6	59.3	179.547	144.444	0.804
1 SHORTS CIRCUITS OF 9500				A/ 1 s -POWER		90250000.000
50	21.9	120.5	58.4	179.736	143.028	0.796
80	22.3	120.1	59.9	179.176	144.568	0.807
135	22.0	120.5	60.2	179.255	145.386	0.811
165	22.4	120.6	60.8	179.526	146.766	0.818
200	22.3	120.4	60.7	179.465	147.639	0.823

TEST RESULTS :

- K; VALUE LESS THEN 1
- CONNECTOR TEMPERATURE LOWER THEN TEMPERATURE OF REFERENCE CABLE
- DK = K(50) - K(50) = 0.008 LESS THEN 0.05
- DK = K(200) - K(50) = 0.027 LESS THEN 0.05
- DT = T(200) - T(50) = 2.3 LESS THEN 10°C

LEGEND :

- T AMB °C --> AMBIENT TEMPERATURE °C
- T REF °C --> REFERENCE CABLE TEMPERATURE °C
- T RAC °C --> CONNECTOR TEMPERATURE DURING HEATING CYCLE IN °C
- R0 E-6 OHM --> RESISTANCE OF REFERENCE CABLE AT 20°C (MILLI-OHM)
- R E-6 OHM --> RESISTANCE OF CONNECTOR AT 20°C (MILLI-OHM)
- K --> COEFFICIENT OF R/R0

На основании чл. 2
от ЗЗЛД

ВСТАНОВИТЕ СЕРИЙНЫЙ НОМЕР

САМОКОВ

066

ELECTRIC AGEING TEST				TEST NUMBER : 9509031		
SICAME CONNECTOR TYPE TTD201AFA				STANDARD : HN33E61		
NUMBER OF CONNECTORS TESTED : 4				MAIN CABLE SECTION : 95mm ² Alu		
CONNECTOR 3				TAP CABLE SECTION : 95mm ² Alu		
				NUMBER OF CYCLES REQUIRED:200		
N ^o CYCLE	T AMB (°C)	T REF (°C)	T RAC (°C)	R0 E-6 Ohm	R E-6 Ohm	K
0	21.5	120.2	58.0	179.023	144.142	0.805
25	22.0	120.5	60.6	179.496	145.024	0.808
50	21.8	120.6	61.0	179.547	146.227	0.814
4 SHORTS CIRCUITS OF 9500 A/ 1 s -POWER				90250000.000		
50	21.9	120.5	60.4	179.736	144.118	0.802
80	22.3	120.1	60.9	179.176	144.718	0.808
135	22.0	120.5	61.5	179.255	145.438	0.811
165	22.4	120.6	62.0	179.526	146.964	0.819
200	22.3	120.4	61.8	179.465	147.982	0.825

TEST RESULTS :

- K; VALUE LESS THEN 1
- CONNECTOR TEMPERATURE LOWER THEN TEMPERATURE OF REFERENCE CABLE
- DK = K(50) - K(50) = 0.012 LESS THEN 0.05
- DK = K(200) - K(50) = 0.023 LESS THEN 0.05
- DT = T(200) - T(50) = 1.4 LESS THEN 10°C

LEGEND :

- T AMB °C --> AMBIENT TEMPERATURE °C
- T REF °C --> REFERENCE CABLE TEMPERATURE °C
- T RAC °C --> CONNECTOR TEMPERATURE DURING HEATING CYCLE IN °C
- R0 E-6 OHM --> RESISTANCE OF REFERENCE CABLE AT 20°C (MILLI-OHM)
- R E-6 OHM --> RESISTANCE OF CONNECTOR AT 20°C (MILLI-OHM)
- K --> COEFFICIENT OF R/R0

На основание чл. 2
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ВЪПРОС С ОРИГИНАЛА

САМОКОНТРОЛ

667

ELECTRIC AGEING TEST				TEST NUMBER : 9509031		
SICAME CONNECTOR TYPE TTD201AFA				STANDARD : HN33E61		
NUMBER OF CONNECTORS TESTED : 4				MAIN CABLE SECTION : 95mm ² Alu		
CONNECTOR 4				TAP CABLE SECTION : 95mm ² Alu		
				NUMBER OF CYCLES REQUIRED:200		
N° CYCLE	T AMB (°C)	T REF (°C)	T RAC (°C)	R0 E-6 Ohm	R E-6 Ohm	K
0	21.5	120.2	56.6	179.023	143.995	0.804
25	22.0	120.5	59.2	179.496	146.411	0.816
50	21.8	120.6	59.8	179.547	146.921	0.818
1 COURTS CIRCUITS DE 9500 A/ 1 s -PUISSANCE 90250000.000						
50	21.9	120.5	58.2	179.736	145.802	0.811
80	22.3	120.1	59.4	179.176	147.336	0.822
135	22.0	120.5	60.8	179.255	149.390	0.833
165	22.4	120.6	61.4	179.526	150.668	0.839
200	22.3	120.4	61.6	179.465	151.400	0.844

TEST RESULTS :

- K; VALUE LESS THEN 1
- CONNECTOR TEMPERATURE LOWER THEN TEMPERATURE OF REFERENCE CABLE
- DK = K(50) - K(50) = 0.007 LESS THEN 0.05
- DK = K(200) - K(50) = 0.033 LESS THEN 0.05
- DT = T(200) - T(50) = 3.4 LESS THEN 10°C

LEGEND :

- T AMB °C --> AMBIENT TEMPERATURE °C
- T REF °C --> REFERENCE CABLE TEMPERATURE °C
- T RAC °C --> CONNECTOR TEMPERATURE DURING HEATING CYCLE IN °C
- R0 E-6 OHM --> RESISTANCE OF REFERENCE CABLE AT 20°C (MILLI-OHM)
- R E-6 OHM --> RESISTANCE OF CONNECTOR AT 20°C (MILLI-OHM)
- K --> COEFFICIENT OF R/R0

На основании чл. 2
от 33ЛД

ВАРШОВСКОЕ ОПРОТОВАНИЕ

САМОКОНТРОЛЬ

SHORT CIRCUIT TEST ACCORDING TO FRENCH STANDART HN 33E61
SICAME CONNECTORS TYPE TTD 201 AFA

Number of connectors tested : 4
 Number of short circuits : 4
 Cable section : 95mm²Alu
 Current flow required during 1 s : 9500 A
 Energy required during 1 s : 90250000.000

N° C.C	1	2	3	4
Time C.C (s)	1	1	1	1
I C.C (A)	9348	9487	9468	9478
P C.C (I ² .t)	87385104.0	90003169.0	89643024.0	89832484.0
T'réf (°C)	158.8	163.3	162.4	163.3
T'1 (°C)	42.1	43.6	43.5	44.0
T'2 (°C)	43.2	45.2	44.9	45.2
T'3 (°C)	40.5	42.5	42.5	43.2
T'4 (°C)	43.6	45.8	44.9	45.6

- N° C.C -----> Number of short circuit
- Temps C.C (s) -----> Short circuit time in seconds
- I C.C (A) -----> Short circuit current in amperes
- P C.C (I².t) -----> Actual energy during short circuit
- T'réf (°C) -----> Reference cable temperature in °C
- T'x (°C) -----> Connector temperature number x in °C

SUP ER 020
INDICE A

VISA RESPONSABLE DE L'ESSAI	VISA VERIFICATEUR

ВЪРХНО С ОРГАНИЗАЦИЯТА



067

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sicame

Laboratoire d'essais
Direction Etudes et Recherches

Test report : Climatic ageing Test
Test number : 02 09 471
Product brand : SICAME
Product type : TTD 201 AFA

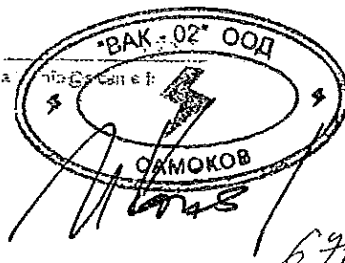
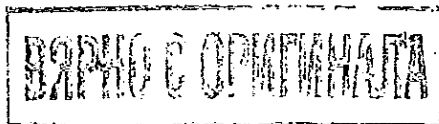
Demandeur of the test : DER
Starting date of the test : 03/09/2002
Report emission date : 11 JUIN 2003
According to standard : NFC 33 020 § 2.6 (June 98)
This report contains : 4 pages and 0 annex

Conclusion : The tested SICAME LV insulation piercing connectors (type TTD 201 AFA) conform to the requirements of NFC 33 020 § 2.6 (June 98) standard.

This is an English translation. The original French test report is the only reference version

На основание чл. 2
от ЗЗЛД

This document cannot be reproduced even partially without the authorization of SICAME SA.



690

1 Equipment used during test.

Equipment used

N° U.F.	Designation	Characteristic
98 01 86	Electronic torque wrench ETW25	Accuracy 4%
91 02 69	Dielectrimeter BOUCHET	Accuracy 0,5mA and 200V
92 02 82	Stop watch	Accuracy 1s
99 00 41	Conductimeter	Accuracy 30µS/cm
93 00 79	Climatron n°2	Conform to C 20-540

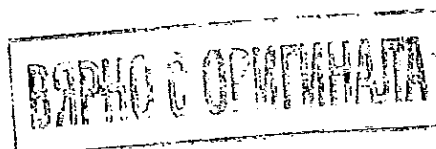
Cables

	Main cable	Main cable	Tap cable
Section	35	95	25
Nature	Aluminium	Aluminium	Aluminium
Standard	NF C 33-209	/	NF C 33-209
From	France	England	France
Identification n°	9988	5060	9973
Conditioned on	23/10/2001 (1h00 at 120°C)	23/10/2001 (1h00 at 120°C)	29/10/2001 (1h00 at 120°C)

2 Product tested

Designation : TTD 201 AFA
 Quantity : 4
 Batch number : 02M115330
 Identification : 1 and 2 for 35 mm² cross-section
 3 and 4 for 95 mm² cross-section
 Reception date at the laboratory on the : 02/09/2002

Visa supervisor of the test



679

3 Test procedure

Connectors are tested according to NFC 33 020 § 2.6 (june 98) standard.

Procedure

Connectors are tightened up to the minimum torque indicated by the manufacturer. They are mounted on the smallest and largest cross-sections on the main core and to the smallest cross-section on the tap core.

The assembly of connector and cores, maintained in a rigid and appropriate way, is placed at the bottom of a water tank. The water height is 30 cm measured from the upper part of the connector, and the cores are long enough out of the water to avoid flashover. The resistivity of the water is less than 200 Ωm and its temperature is recorded for information.

The voltage generator is tripping for a leakage current of (10,0 \pm 0,5) mA.

After 30 min under the water, the voltage test is applied to the sample with a 6 kV a.c. voltage for 1 minute.

The a.c. voltage is applied to a rate of approximately 1 kV/s.

The samples are submitted to the climatic ageing test according to NF C 20-540 with the following details :

- 6 weekly cycles are required at the enclosure temperature (70 \pm 2) $^{\circ}\text{C}$ for phases A and C.

After the climatic ageing cycles, the following voltage tests are carried out:

The connectors and the adjacent parts of core horizontally disposed are covered by 1 cm to 2 cm without mechanical stress of metallic balls. After at least 1 min, a voltage test at 6 kV is carried out for 1 min between the core conductors and the metallic balls. The a.c. voltage is applied to a rate of approximately 1 kV/s. The voltage generator shall trip for a leakage current of (10,0 \pm 0,5) mA.

No flashover shall occur (tripping of voltage generator).

The set formed by the connector and the tap core is taken out of the balls without mechanical stress. The voltage test before the climatic ageing test is carried out, but with a voltage of 1 kV.

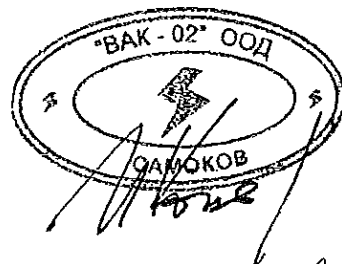
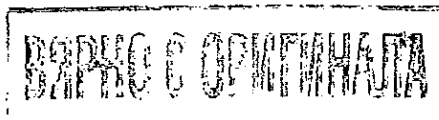
No flashover shall occur (tripping of voltage generator).

Preparation

Connectors number 1 and 2 are mounted with 35 mm² cross main section and 25 mm² cross tap section.

Connectors number 3 and 4 are mounted with 95 mm² cross main section and 25 mm² cross tap section.

Visa supervisor of
the test



4 Results

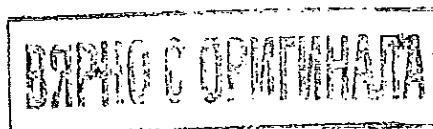
	Standard requirements	Results
Ambient temperature and humidity conditions	Between 15 and 35°C Between 25 and 75% HR	22°C 53 % HR
Water resistivity	< 200 Ωm	235 μS/cm so 42,55 Ωm
Water temperature	For information	19°C
Torque (Nm)	Minimum torque : 16,5	Connector n°1 : 16,5 Connector n°2 : 16,5 Connector n°3 : 16,5 Connector n°4 : 16,5
6 kV during 1 min before climatic ageing test.	No flashover	Connector n°1 : No flashover Connector n°2 : No flashover Connector n°3 : No flashover Connector n°4 : No flashover
6 kV during 1 min in metallic balls after climatic ageing test.	No flashover	Connector n°1 : No flashover Connector n°2 : No flashover Connector n°3 : No flashover Connector n°4 : No flashover
1 kV during 1 min in water after climatic ageing test.	No flashover	Connector n°1 : No flashover Connector n°2 : No flashover Connector n°3 : No flashover Connector n°4 : No flashover

5 Requirements

No flashover occurred during the test .

The marking allowing the samples identification is legible when examined with normal or corrected vision, without magnification.

Visa supervisor of the test



673

SICAME

DER

Project N° : 9402111

DATE : 08/02/1994

INSTALLATION TEST AT LOW TEMPERATURE
Product brand : SICAME
Product type : TTD 201AFA

Demander of the test : SICAME DER

Product brand : SICAME

Product type : TTD 201AFA

According to standard : NFC 33-020 project (November 93)

CONCLUSION : The SICAME preinsulated crimping lugs type
TTD 201 AFA conform to the NFC 33-020
standard(11/1993) requirements.

ВАРНИК С ОПИТИВАНАТА



SICAME DER	EQUIPMENT USED FOR LOW TEMPERATURE TESTS ACCORDING TO SPECIFICATION : NF C 33-020	SUP ER 1170 INDICE B
---------------	--	-------------------------

Test number : 9402111
 Manufacturer : SICAME
 Product : TTD 201AFA

A - Computer Equipment

IBM PS2 (Inv N': 88 93 05) Hard disk 115 MB
 Analog/Digital card
 Digital/Analog card
 Disk Operating System: DOS 6.1 IBM
 IBM 4029 020 (Inv N': 92 03 30) Laser printer

B - Equipment for Electrical and Thermal measurement

Buzzer SICAME (Inv N': 92 04 20)

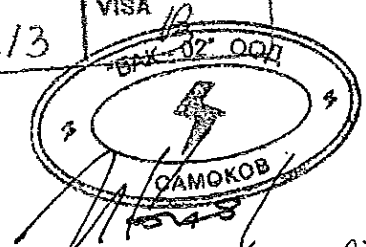
C - Equipment for Climatic Tests

Low Temperature Chamber (Inv N': 91 02 44) -30°C to +20°C

D - General Equipment

Digital caliper (Inv N': 93 06 07) MITUTOYO
 Electronic Torque wrench (Inv N': 92 03 31)
 Calibrat Ruler (Inv N': 94 01 17) ROCH

LABORATOIRE SICAME
 ESSAI 94 02 111
 FOLIO 213 VISA
 94-02-001



ВЪРНО С ОРНИМАТА

675

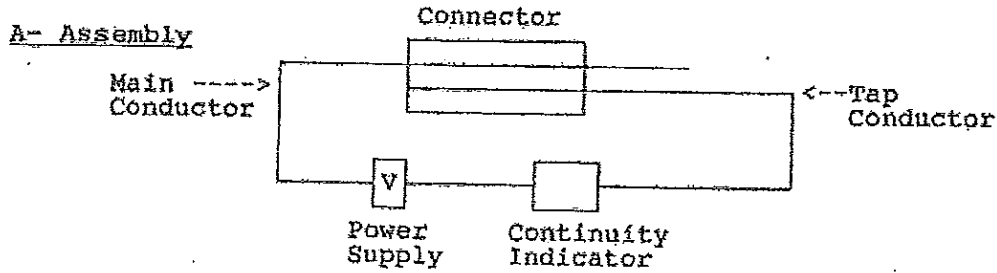
SICAME	LOW TEMPERATURE TEST ACCORDING TO SPECIFICATION : NF C 33-020	SUP ER 570
DER		INDICE B

Test number : 9402111 Date:08/02/1994 Ambient Temperature :-10.2°C

Product brand : SICAME

Product type : TTD 201AFA

Fitted with Shear Heads : F1318



B- Test Procedure

The connector is fitted without tightening on the main and tap conductor as indicated in the above layout.

Smallest and largest cross sections cores for the main and largest cross section for the tap are used as indicated for the connector being tested. The assembly is placed in a chamber at a temperature of -10°C (+/-1)°C.

After one hour, the connector is tightened (whilst in the chamber) up to a torque of 70% of the minimum torque indicated by the manufacturer.

C- Readings

Connector N°	Cable sizes used (mm ²)		Torque value to achieve electrical continuity		
	Main (mm ²)	Tap (mm ²)	Main (Nm)	Tap 1 (Nm)	Tap 2 (Nm)
1	70	70	3.2	/	/
2	70	70	3.4	/	/
3	70	25	5.3	/	/
4	70	25	3.3	/	/
Connector N°	Result	Observations	<u>General Observations:</u> Cable : 4 * 70 mm ² Alu 4 * 25 mm ² Alu		
1	OK	< 16.5 * 0.7			
2	OK	< 16.5 * 0.7			
3	OK	< 16.5 * 0.7			
4	OK	< 16.5 * 0.7			

LABORATOIRE SICAME
 ESSAI 9402111
 FOLIO 3/3
 VISA



ВАРНОЕ СЕРТИФИКАТА

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626



sicame

Laboratoire d'essais
Direction Etudes et Recherches

Test report : Installation test at low temperature
Test number : 0110380
Product brand : SICAME
Product type : TTD201AFA

Demandeur of the test : DER

Starting date of the test : 24/10/2001

Report emission date : 11 JUIN 2003

According to standard : NF C 33-020 (June 98) sub-clause 2.5

This report contains : 3 pages

Conclusion : The SICAME LV insulation piercing connectors type TTD201AFA conform to the requirements of NF C 33-020 (June 98) sub-clause 2.5 standard.

This is an English translation, The original French report test is the only reference version

На основание чл. 2
от ЗЗЛД

Accreditation 1-1058, Scope on request.

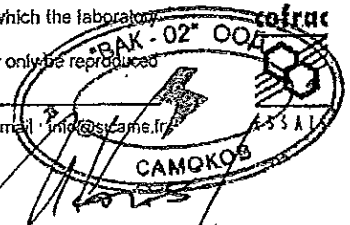
The Cofrac testing section accreditation ensures the competence of the Laboratory staff for the tests for which the laboratory has qualified.

This report applies only to the products as listed above. With the authorization of Sicame S.A., this report may only be reproduced in its totality.

0 0281 01

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ВЪРХУ С ОПИТИВАНАТА



677

1 Equipment used during test

1.1 Equipment used

N°UT	Designation	Characteristic
98 01 86	Electronic torque wrench ETW25	Accuracy 4%
94 02 26	Torque wrench	Accuracy 4%
91 02 44	Low temperature chamber	Accuracy 1°C
92 04 20	Buzzer SICAME	-- -- --

1.2 Cables

	Main core	Main core	tap core
Section	35 mm ²	95 mm ²	95 mm ²
Nature	Aluminium	Aluminium	Aluminium
requirements	NF C 33-209	UNE 21-030-92	UNE 21-030-92
From	France	Spain	Spain
Identification number	9972	9964	9964
conditioned	At 120°C during 1 hour the 05/07/2001	At 120°C during 1 hour the 02/05/2001	At 120°C during 1 hour the 02/05/2001

2 Product tested

Designation : TTD201AFA
 Quantity : 4
 Project number : E0170110
 Batch number : 01S02643
 Identification : 1 and 2 for 35 mm² cross-section
 3 and 4 for 95 mm² cross-section
 Reception date at the laboratory on the : 24/10/2001

Visa supervisor of the test

02.004
САМОКОВ

ВЯРНО С ОРГАНИЗАТА

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3 Test

Connectors are tested according to NF C 33-020 (June 98) sub-clause 2.5 standard.

3.1 Procedure

Connectors are loosely installed on the main core and on the tap core with stranded conductor corresponding to the smallest and largest cross-sections on the main core and to the largest cross-section on the tap core.

Connectors are placed in an enclosure kept at $(-10 \pm 1.3)^\circ\text{C}$.

After 1 h, while still inside the enclosure, connectors are tightened with a torque of 0,7 times the minimum torque indicated by the manufacturer.

The electrical circuit would be closed.

3.2 Preparation

Connectors number 1 and 2 are mounted with 35 mm^2 cross main section and 95 mm^2 cross tap section.

Connectors number 3 and 4 are mounted with 95 mm^2 bared cross main section and 95 mm^2 cross tap section.

4 Results

	Standard requirements	Results
Low temperature chamber	Between -13 and -9°C	$-11,1^\circ\text{C}$
Closure of the electrical circuit torque (Nm)	Minimum torque : $0,7 \times 16,5$ then $11,55 \text{ Nm}$	Connector n°1 : $6,25$ Connector n°2 : $5,5$ Connector n°3 : $5,75$ Connector n°4 : $5,75$

5 Requirement

The indicator indicates the closure of the electrical circuit before 0,7 times the minimum torque.

ВЯРНО С ОПРЕГНАТА

Visa supervisor
of the test
"BAK-015001"
САМОКОВ

СПИСЪК НА ОТДЕЛНИТЕ ИЗПИТВАНИЯ НА КЛЕМА ТИП ТТД 201 АГА

1. № на тест: 9810341 - Диелектричен тест;
2. № на тест: 9509031 - Тест за стареене под въздействие на електричество;
3. № на тест: 0209471 - Тест за стареене под въздействие на климатични условия;
4. № на тест: 9402111 - Тест за инсталиране при ниска температура;
5. № на тест: 0110380 - Тест за инсталиране при ниска температура.

На основание чл. 2
от ЗЗЛД

Съставил:



LABORATOIRE D'ESSAIS
TEST LABORATORYDate : 21/11/97
Date : 21/11/97

RAPPORT D'ESSAIS TEST REPORT

REPRISE DES ESSAIS
SUITE A L'EVOLUTION DU PRODUIT
CBS/CT 150 (K 324)
N° 061-97-36-04RESUMING OF TESTS
FOLLOWING THE PRODUCT EVOLUTION
CBS/CT 150 (K 324)
N° 061-97-36-04DEMANDEUR : Bureau d'Etudes MICHAUD SA
REQUESTED BY : MICHAUD SA's Research Department

PRESENTATION : Ce document regroupe les essais mécaniques, diélectriques, de vieillissements électrique et climatique et de montage à basse température du CBS/CT 150 (K 324), suite à l'évolution du produit. Les matériels testés sont de fabrication MICHAUD SA.

Les modalités d'essais retenues sont celles de la norme C 33-020 d'Avril 1997.

INTRODUCTION : This document gathers the mechanical, dielectric, electrical and climatic ageing and assembly at low temperature tests of CBS/CT 150 (K324) following the product evolution. Tested products are of MICHAUD's manufacture.

The test procedures are the ones of the standard C 33-020 dated July 1994.

На основание чл. 2
от ЗЗЛД

DIFFUSION : Le 25/05/1998 - 1 exemplaire original UR (LE)
Le 17/03/2011 - 1 exemplaire original VAK-02 (Bulgarie)
- 1 exemplaire original COM (Classement Client)

ISSUANCE : On the 25/05/1998 - 1 original to UR (LE)
On the 17/03/2011 - 1 original to VAK-02 (Bulgarie)
- 1 original to COM (Customer Filing)

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Any copy of this test report is authorized only as a complete photographic facsimile after written authorization from the test laboratory of MICHAUD. The test report hereafter concerns only the samples tested.

Ce document comporte 20 pages (y compris la présente page 1).
This document includes 20 pages (including this page 1).

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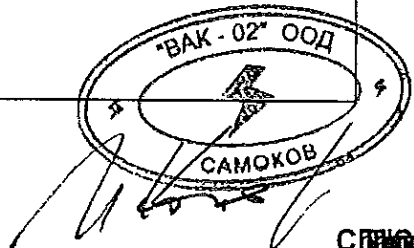
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1.2 Tested products	3
1.3 Order of tests.....	3
II) STANDARD DOCUMENTS REFERRED TO IN THIS TEST REPORT	3
III) GENERAL CONDITIONS	4
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2.3.3 Checking mechanical strength of tap cores	7
2.4 Voltage and watertightness tests	8
2.5 Installation test at low temperature.....	9
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(*) The paragraph numbers are given in the standard C33-020 dated April 1997.

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ВЪРНО С ОПРИГНАЛАТА



СПИСОКЪ
1002

I) INTRODUCTION

1.1 Subject

This document gathers the mechanical, dielectric, electrical and climatic ageing and assembly at low temperature tests of CBS/CT 150 (K324) following the product evolution. Tested products are of MICHAUD's manufacture.

Test procedures are the ones of the standard C 33-020 dated April 1997.

For each test, there is a test sheet grouping procedures and results.

1.2 Tested products

Tested products are insulation piercing connectors according to the indicated technical file "CBS/CT 150 EDF 03.91 INDICE 02". These products are coming from an industrial series. The test laboratory has received them on the 08/09/1997.

DESIGNATION	CODE	N° OF BATCH
CBS/CT 150	K 324	97-36-00

1.3 Order of tests

Samples are numbered from 1 to 24.

NUMBER OF SAMPLES	TESTS
1 to 4	2.3.1 Checking electrical continuity, shearheads and mechanical behaviour of the connector
5 to 8	2.3.2 Effect of tightening on the mechanical strength of the main core
9 and 10	2.3.3 Checking mechanical strength of tap cores
11 to 14	2.4 Voltage and watertightness tests 2.6 Climatic ageing test
15 to 18	2.5 Installation test at low temperature
19 to 24	2.8 Electrical ageing test

Note : The numbers of tests are the ones corresponding to the standard C 33-020 of April 1997.

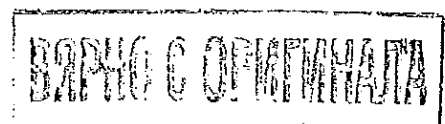
II) STANDARD DOCUMENTS REFERRED TO IN THIS REPORT

- French standards

NF C 20-540 : January 1990,
«Environmental testing - Test methods - Climatic ageing test of equipment and synthetic materials for outdoor use».

C 33-004 : Draft dated April 1997,
«Insulated cables and their accessories for power systems
Connecting equipment for overhead distributions and services of rated voltage 0,6/1kV with at least one insulated core - Electrical ageing test».

C 33-020 : April 1997,
«Insulated cables and their accessories for power systems - Insulation piercing branch - connectors for overhead distributions and services with bundle assembled cores, of rated voltage 0,6/1kV».



NF C 33-209 : July 1996,
«Insulated or protected cables for power systems - Bundle assembled cores for overhead systems of rated voltage 0,6/1kV».

III) GENERAL CONDITIONS

• Temperature

Tests are carried out at the room temperature of the test laboratory.

• Cores used

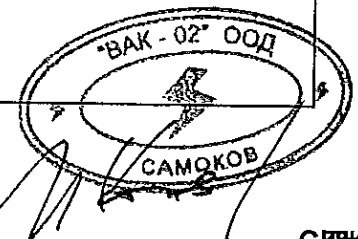
STANDARD REFERENCE	NAME OF MANUFACTURER	NOMINAL CROSS-SECTIONAL AREA (in mm ²)	NUMBER OF STRANDS AND COMPOSITION OF CONDUCTOR	ØOVER INSULANT (in mm)	ØOVER CONDUCTOR (in mm)
NF C 33-209	Câblerie de Lens	150	19 strands aluminium	17,6	14,5
NF C 33-209	Câblerie de Lens	54,6N	7 strands aluminium alloy	12,5	9,4
NF C 33-209	Câblerie de Lens	25	7 strands aluminium	9,0	6,1
NF C 33-209	Câblerie de Lens	16	7 strands aluminium	7,2	4,7

Before tests, cores are conditioned, according to § 2.2.2 of the standard C 33-020 dated April 1997, as follows : they are put in an enclosure during 1 h at 120°C, then the door of the enclosure is opened so that cores cool to room temperature.

IV) TESTS

On the following pages, sheets of each performed test can be found.

ВЪРНО С ОРГЕНИЗАЦИЯТА



TEST DESCRIPTION : 2.3.1 Checking electrical continuity, shearheads and mechanical behaviour of the connector.	Page 1/1
---	----------

DATE : ON THE 10/09/1997 PLACE : MICHAUD test laboratory	OPERATOR : N. PETITJEAN Y. DEBIESSE-TIXIER
---	---

N° OF SAMPLES : 1 to 4

<u>TEST EQUIPMENTS</u>	N°	<u>PROCEDURES</u> TITLE
- Tightening test machine (UP K)	1	General
- DIGIPINCE II clamp-on probe	1	General
- MICHAUD horizontal tensile bench	1	General

TEST CONDITIONS

General conditions

PROCEDURES

Procedures and acceptance criteria are the ones of § 2.3.1 of standard C 33-020 dated April 1997.

A 1m main core section is stretched on the MICHAUD horizontal tensile bench. All the tightening process of this test is carried out by means of the tightening test machine according to the annexe C of the standard C 33-020.

The connector is fitted on the stretched main core and a tap core. The screw of the connector is tightened up to 0,7 times the minimal torque : contact shall have occurred between the cores (this is checked by means of the DIGIPINCE II clamp-on probe).

Then, the screw of the connector is tightened until shear-head breaks.

The tightening value at the breakage is recorded. It shall be comprised between the margins given by the manufacturer.

The screw of the connector is then tightened up to 1,5 times the maximum torque.

No breakdown of the connector or the core conductor shall occur.

Finally, for information, the screw of the connector is tightened until one of these elements breaks.

TEST RESULTS

N° OF SAMPLES	SECTION OF CORES (in mm ²)		TENSILE STRENGTH (in daN)	CONTACT AT 0,7 TIMES THE MINIMUM TORQUE (7,5N.m)	MINI. SHEAR-HEADS BREAKAGE TORQUE (in N.m)	SHEAR-HEADS BREAKAGE TORQUE (in N.m)	MAXI. SHEAR-HEADS BREAKAGE TORQUE (in N.m)	COMMENTS AFTER TIGHTENING AT 1,5 TIMES THE MAXIMUM TORQUE (24,8N.m)	BREAKAGE TORQUE OF A CONNECTOR ELEMENT (in N.m)
	MAIN	TAP							
1	54,6N	25	350	Satisfactory	13,5	14,8	16,5	Satisfactory	34,3
2	54,6N	25	350	Satisfactory	13,5	15,2	16,5	Satisfactory	33,2
3	150	25	390	Satisfactory	13,5	14,5	16,5	Satisfactory	30,2
4	150	25	390	Satisfactory	13,5	15,9	16,5	Satisfactory	29,5

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ВРПНО С ОРМОНАТА

"BAK - 02" ООД
САМОКОНТРОЛ

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СРЕДНО
68T

MICHAUD SA TEST LABORATORY	TEST REPORT RESUMING OF TESTS FOLLOWING THE PRODUCT EVOLUTION CBS/CT 150 (K 324) N° 061-97-36-04	Date : 21/11/97 Page : 6/20
--------------------------------------	---	--------------------------------

TEST DESCRIPTION: 2.3.2 Effect of tightening on the mechanical strength of the main core. Page 1/1

DATE: ON THE 10/09/1997
PLACE: MICHAUD test laboratory
OPERATORS: N. PETITJEAN
Y. DEBIESSE-TIXIER

N° OF SAMPLES: 5 to 8

TEST EQUIPMENTS	PROCEDURES	
	N°	TITLE
- Dynamometric equipment GRIN 15N.m and 70N.m	1	General
- MICHAUD horizontal tensile bench	1	General

TEST CONDITIONS

General conditions

PROCEDURES

Procedures and acceptance criteria are the ones of § 2.3.2 of standard C 33-020 dated April 1997.

A 1m main core section is stretched initially to 20% of the strength test on the MICHAUD horizontal tensile bench.

The connector is fitted on the stretched main core and a tap core. The screw of the connector is tightened at the maximum torque by carrying out tightening of one quarter turn during approximately 2 seconds, each tightening being spaced out by 2 seconds.

An increasing tensile stress is applied to the conductor of the main core, at a rate between 1 000N/min and 5 000N/min up to the strength test.

This strength is maintained for one minute.

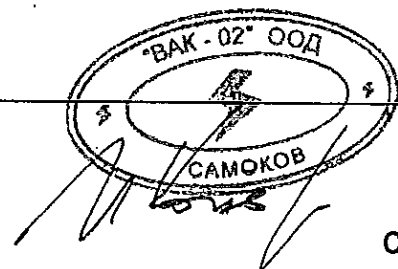
No breakdown of the connector or the main core conductor shall be observed throughout the application of the load.

For information, the increase in tensile strength is resumed at the same speed until breakdown.

TEST RESULTS

N° OF SAMPLE	SECTION OF CORES (in mm ²)		MAXIMUM TIGHTENING TORQUE (in N.m)	INITIAL TENSILE STRESS APPLIED DURING THE CONNECTOR ASSEMBLY (in daN)	TENSILE STRENGTH APPLIED DURING 1 MIN (in daN)	COMMENTS AFTER 1 MIN OF STRENGTH APPLICATION	BREAKAGE TENSILE STRENGTH (in daN)
	MAIN	TAP					
5	54,6N	25	16,5	316	1 580	Satisfactory	1 730
6	54,6N	25	16,5	316	1 580	Satisfactory	1 680
7	150	25	16,5	210	1 050	Satisfactory	2 105
8	150	25	16,5	210	1 050	Satisfactory	2 050

ВЕРНО С ОПИРАНАТА



MICHAUD SA TEST LABORATORY	TEST REPORT RESUMING OF TESTS FOLLOWING THE PRODUCT EVOLUTION CBS/CT 150 (K 324) N° 061-97-36-04	Date : 21/11/97 Page : 7/20
--------------------------------------	---	--------------------------------

TEST DESCRIPTION : 2.3.3 Checking mechanical strength of tap cores	Page 1/1
---	----------

DATE : ON THE 10/09/1997 PLACE : MICHAUD test laboratory	OPERATORS : N. PETITJEAN Y. DEBIESSE-TIXIER
---	---

N° OF SAMPLES : 9 and 10

<u>TEST EQUIPMENTS</u>	<u>PROCEDURES</u>	
	N°	TITLE
- Dynamometric equipment GRIN 15N.m and 70N.m	1	General
- MICHAUD HORIZONTAL TENSILE BENCH	1	General

TEST CONDITIONS

General conditions

PROCEDURES

Procedures and acceptance criteria are the ones of § 2.3.3 of standard C 33-020 dated April 1997.

The connector is fitted on main and tap cores of minimum cross-section. The screw of the connector is tightened at the maximum torque by carrying out tightening of one quarter turn during approximately 2 seconds, each tightening being spaced out by 2 seconds.

An increasing tensile stress is applied to the conductor of the tap core, at a rate between 100N/min and 500N/min up to the value of 290N.

This strength is maintained for one minute.

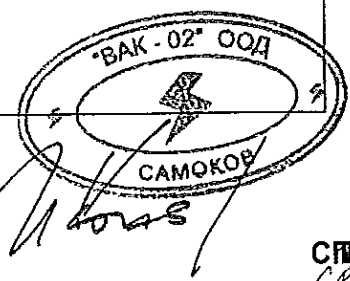
No breakdown or sliding of the tap core conductor shall be observed throughout the application of the load.

For information, the increase in tensile strength is resumed at the same speed until breakage

TEST RESULTS

N° OF SAMPLE	SECTION OF CORES (in mm ²)		MAXIMUM TIGHTENING TORQUE (in N.m)	TENSILE STRENGTH APPLIED DURING 1 min (in N)	COMMENTS AFTER 1 min OF STRENGTH APPLICATION	BREAKAGE TENSILE STRENGTH (in N)
	MAIN	TAP				
9	54,6N	16	16,5	290	Satisfactory	1 550
10	54,6N	16	16,5	290	Satisfactory	1 480

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TEST DESCRIPTION: 2.4 Voltage and watertightness tests Page 1/1

DATE: ON THE 09/09/1997 **OPERATOR:** N. PETITJEAN
PLACE: MICHAUD test laboratory

N° OF SAMPLES: 11 and 14

<u>TEST EQUIPMENTS</u>	N°	<u>PROCEDURES</u> TITLE
- Dielectric test equipment A 1105	1	General
- Dynamometric equipment GRIN 15N.m and 70N.m	1	General

TEST CONDITIONS

General conditions

PROCEDURES

Procedures and acceptance criteria are the ones of § 2.4.1 and 2.4.2 of the standard C 33-020 dated April 1997.

The connector is mounted on an extreme cross-section for main core and on a minimum cross-section for tap core. The screw of the connector is tightened at the minimum torque by carrying out tightening of one quarter turn during approximately 2 seconds, each tightening being spaced out by 2 seconds.

The assembly connector - core is installed vertically in water, as shown below :

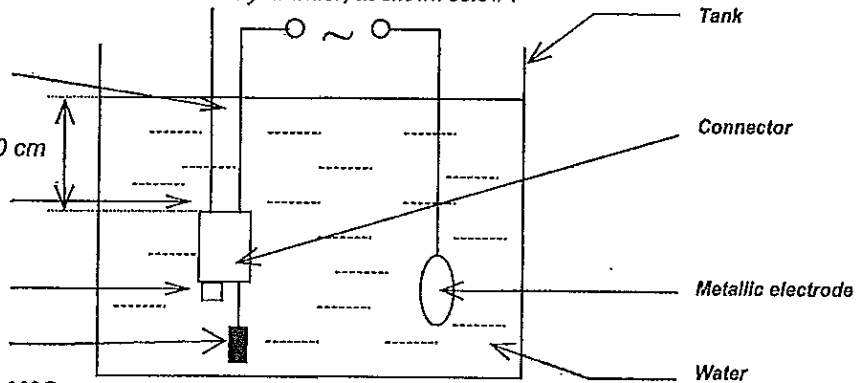
Main conductor

30 cm

Tap conductor

Part of connectors for watertight of tap core

Watertight insulating cap



Tank

Connector

Metallic electrode

Water

The water temperature is 22°C.

Voltage generator used is regulated to release under a 10mA leakage current.

After 30 min under the water, a voltage test is applied to the assembly with a 6 kV voltage at an industrial frequency during one minute. The increase of voltage is performed at a 1 kV/s speed.


No flashover shall occur (tripping of voltage generator).

TEST RESULTS

N° OF SAMPLE	SECTION OF CORES (in mm²)		MINIMUM TIGHTENING TORQUE (In N.m)	COMMENTS AFTER 1 min UNDER 6kV	FOLLOWING TEST
	MAIN	TAP			
11	54,6N	16	13,5	Satisfactory	2.6
12	54,6N	16	13,5	Satisfactory	2.6
13	150	16	13,5	Satisfactory	2.6
14	150	16	13,5	Satisfactory	

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BAPHC 6 09/11/1997


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 PETITJEAN

MICHAUD SA
TEST LABORATORY

TEST REPORT

RESUMING OF TESTS FOLLOWING THE PRODUCT EVOLUTION CBS/CT 150 (K 324)
N° 061-97-36-04

Date : 21/11/97
Page : 9/20

TEST DESCRIPTION : 2.5 Installation test at low temperature

Page 1/1

DATE : ON THE 09/09/1997
PLACE : MICHAUD test laboratory

OPERATOR : N. PETITJEAN

N° OF SAMPLES : 15 to 18

TEST EQUIPMENTS

N°

PROCEDURES

TITLE

- Dynamometric equipment GRIN 15N.m and 70N.m
- Enclosure with regulated temperature - 25°C + 45°C
- DIGIPINCE II clamp-on probe

1 General
1 General
1 General

TEST CONDITIONS

General conditions

PROCEDURES

Procedures and acceptance criteria are the ones of § 2.5 of standard C 33-020 dated April 1997.

The connector is fitted on an extreme cross-section for main core and on a maximum cross-section for tap core.

The assembly is installed in the enclosure with regulated temperature - 25°C + 45°C, at a temperature of - 11°C.

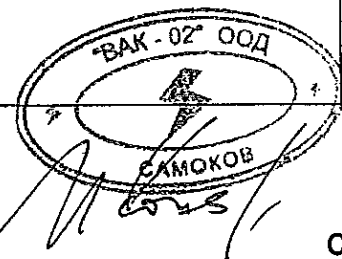
After one hour, the assembly being kept in the enclosure, the DIGIPINCE II clamp-on probe is connected to the assembly, in order to check that current flows. The screw of the connector is tightened until contact between cores is established.

The contact establishment tightening torque must be less or equal to 0,7 times the minimum shear-head breakage torque : 9,4N.m.

TEST RESULTS

N° OF SAMPLE	SECTION OF CORES (in mm ²)		CONTACT ESTABLISHMENT TORQUE (in N.m)	COMMENTS
	MAIN	TAP		
15	54,6N	25	5,9	Satisfactory
16	54,6N	25	6,0	Satisfactory
17	150	25	6,2	Satisfactory
18	150	25	6,9	Satisfactory

ВЕРНО С ОПИШИВАЮЩА



MICHAUD SA
TEST LABORATORY

TEST REPORT
RESUMING OF TESTS FOLLOWING THE PRODUCT EVOLUTION CBS/CT 150 (K 324)
N° 061-97-36-04

Date : 21/11/97
Page : 10/20

TEST DESCRIPTION : 2.6 Climatic ageing test

Page 1/2

DATE : FROM 17/09/1997 TO 29/10/1997

PLACE : MICHAUD test laboratory

OPERATOR : N. PETITJEAN

N° OF SAMPLES : 11 to 14

TEST EQUIPMENTS

PROCEDURES

N°

TITLE

- Climatic ageing enclosure XR 35
- Dielectric test equipment A 1105

1 General
1 General

TEST CONDITIONS

General conditions

PROCEDURES

Procedures and acceptance criteria are the ones of § 2.6 of standard C 33-020 dated April 1997.

CLIMATIC TEST

Procedures of this test are the ones of standard NF C 20-540 dated January 1990.

Samples support 6 weekly cycles, enclosure temperature is 70 (± 2) °C for phases A and C.

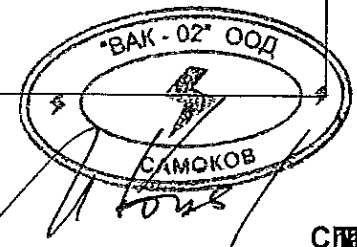
ACCEPTANCE CRITERIA

After test, samples are kept during 48 hours at the room temperature of the laboratory.

Then the two following dielectric tests are performed :

- Samples, placed horizontally, are covered with lead balls with 1,3 to 1,7mm diameter, by about 2cm.
After 1min, a voltage test is carried out on the samples at 6kV at an industrial frequency for 1 min, applied between conductor and metallic balls
Increase of voltage is performed at a 1kV/s speed. Release point of the dielectric equipment is regulated at 10mA.
No breakage shall occur.
- As soon as the sample has been kept out of the balls, it is put under water as indicated at § 2.4.1.
After 30min under water, a voltage test is applied on the assembly at a rate of approximately 1kV at an industrial frequency during 1 min.
No breakdown shall occur.
For information, the increase in voltage is resumed until breakage.
Finally, a visual control of samples is carried out to ensure that the pieces marking remains readable to the normal or corrected naked eye, without magnifying equipment.

ВАРНО С ОПИТИВАНАТА



TEST DESCRIPTION : 2.6 Climatic ageing test Page 2/2

TEST RESULTS

N° OF SAMPLE	PREVIOUS TEST	COMMENTS AFTER CLIMATIC TEST	COMMENTS AFTER 1 min UNDER 6kV IN THE BALLS	COMMENTS AFTER 30 min OF IMMERSION AND 1 min UNDER 1kV IN WATER	BREAKAGE VOLTAGE (in kV)	VISUAL CONTROL
11	2.4.1	Satisfactory	Satisfactory	Satisfactory	6,2	Satisfactory
12	2.4.1	Satisfactory	Satisfactory	Satisfactory	5,5	Satisfactory
13	2.4.1	Satisfactory	Satisfactory	Satisfactory	6,7	Satisfactory
14	2.4.1	Satisfactory	Satisfactory	Satisfactory	5,9	Satisfactory



БЪЛГАРСКО СЪОБЩЕСТВО

СЕРТИФИКАТ
6911

TEST DESCRIPTION: 2.8 Electrical ageing test

Page 1/5

DATE : FROM 03/11/1997 TO 24/11/1997

OPERATOR : JP. ROPY

PLACE : MICHAUD test laboratory

N° OF SAMPLES : 19 to 24

TEST EQUIPMENTS	N°	PROCEDURES TITLE
- Humid heating enclosure	1	General
- N° 3 electrical ageing bench	7	Electrical ageing according to Pr C 33-004
- Dynamometric equipment GRIN 15N.m and 70N.m	1	General
- Measure station SA 70 N3	1	General
- Printer LQ 860 N3	1	General

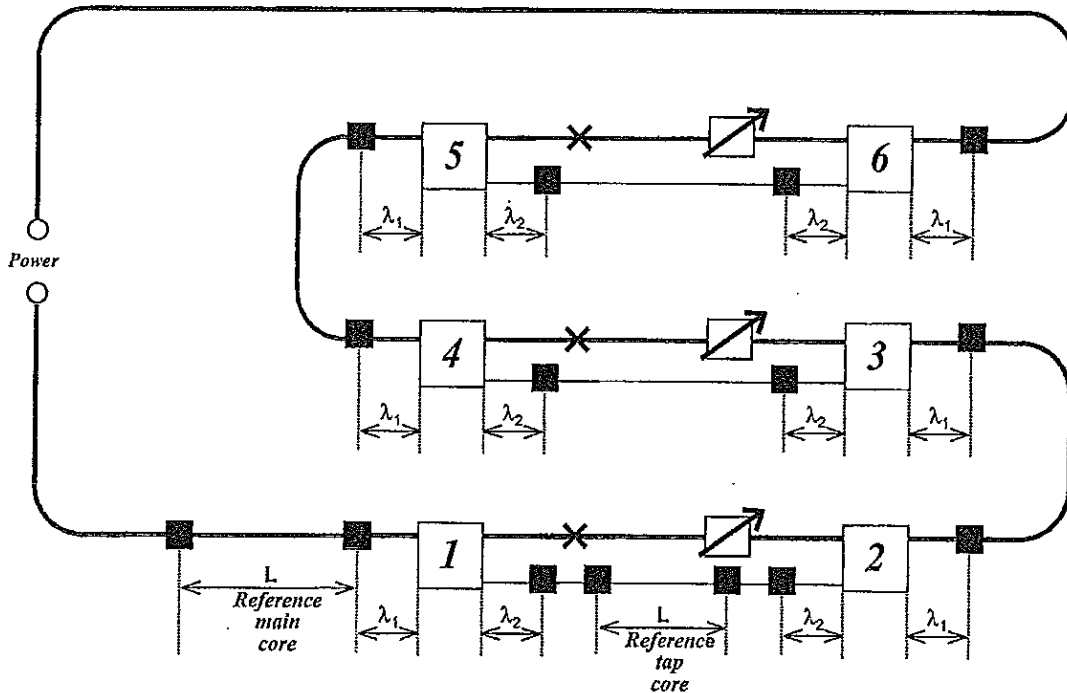
TEST CONDITIONS

General conditions

PROCEDURES

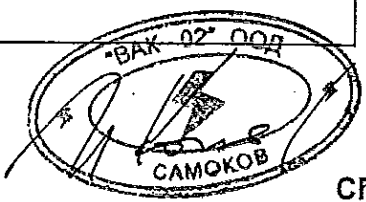
Procedures and acceptance criteria are the ones of § 2.8 of standard C 33-020 dated April 1997. This paragraph refers to the procedures and acceptance criteria of the draft standard C 33-004 dated April 1997.

The performed test loop is the loop "D" in shape of "Z" :



Minimal distance between each connector : 1 000mm
Minimal distance between the source and the voltage measures : 500mm









ВАРИАНТ С ОПРЕДЕЛЕНАТА



TEST DESCRIPTION: 2.8 Electrical ageing test

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LEGEND

	Connector		Aluminium insulated main core 150mm ²
	Voltage measure (equalizers)		Aluminium stripped main core 150mm ²
	Impedance adaptor		Aluminium insulated tap core 25mm ²
	Contacteur		Aluminium stripped tap core 25mm ²

1. Preparation of the loop

- Parameters of the loop are calculated :

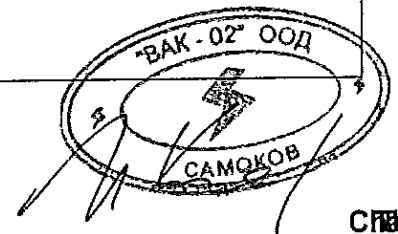
TYPE OF TEST LOOP	SHAPE OF THE LOOP	L (in mm)	λ_1 (in mm)	λ_2 (in mm)
D	Z	400	250	150

- Voltage measures are performed by means of equalizers (welding method : «TIG», metal filler : aluminium 1 050A) on the aluminium cores. They are placed as indicated on the previous scheme.
- 150mm² aluminium cores are equipped at the extremity with compression lugs for the linking to the electrical ageing bench and to contactors.
- On the part of the mains core comprised between the connectors, it is installed :
 - A contacteur allowing to carry out the resistance measures,
 - An impedance adaptor allowing the intensity regulation in order that the reference core temperature remains comprised between 110°C and 120°C.
- The tap core is stripped over a L length between two equalizers.
- The reference core is stripped over a length L between two equalizers.

2. Assembly of the loop

- The connectors are tightened on the main and tap cores at the minimal shear-head breakage torque (13,5N.m) by carrying out tightening of one quarter turn in approximately 2 seconds, each tightening being spaced out by 2 seconds.
- Cores equipped with lugs are linked to each other and to the ageing bench by means of M12 brass bolts tightened at the torque of 29N.m.

ВЕРНО С ОПРЕДЕЛЕНИЯ



TEST DESCRIPTION : 2,8 Electrical ageing test

Page 3/9

- Temperature measure points are installed as follows :

	TYPE OF THERMOCOUPLE	PLACE OF FIXING	TYPE OF HOLD
Connector	- type «k», «sheathed» in a tube of inconel, - diameter 1 mm, - length 30 mm.	- at the level of the lower part of the contact bridge, in a 1,2mm diameter hole	- covered with «thermoconductor» grease - holding with a mastic type «polyurethane»
Reference core	- type «k», - diameter 0,5 mm.	- at the middle of the reference core conductor	- holding through a splice (copper wire diameter 0,4mm) - covered with «thermoconductor» grease
Room temperature	- type «k», «sheathed» in a tube of inconel, - diameter 1 mm, - length 30 mm.	- at the middle of the loop at 20cm under the horizontal level containing the connectors (in a vertical metallic tube)	/

3. Process of a cycle

Each cycle is made up of a heating period, followed by a stabilization period and finally a cooling period.

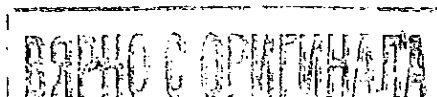
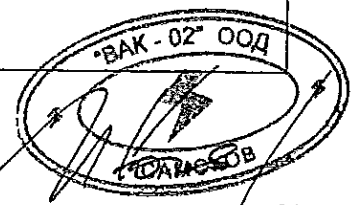
The heating is performed by the crossing of an alternating current. The temperature of reference core is then stabilized at $(120 \pm 2)^\circ\text{C}$ by the crossing of a lower alternating current. We check that the reference main core temperature is comprised between 110°C and 120°C .

The cooling is speeded up by air blowing.

PERIOD	DURATION (in min)	INTENSITY (in A)	
		REFERENCE MAIN CORE	REFERENCE TAP CORE
Heating	11	≈ 650	≈ 190
Stabilisation	35	≈ 495	≈ 145
Cooling	35	/	/

4. Performing of the test - Measures

- Resistance measures are performed under a direct current of 10A before the first heating period, then every 10 cycles at the end of the cooling period.
- Resistance values are computed for a temperature of 20°C before exploitation and the real connectors resistances (R_j) are calculated according to the § 5.3.3.4 of the standard C 33-004.
- Temperature measures are performed at the end of the stabilization periods at the first cycle, then every 10 cycles.
- The test comprises 200 electrical ageing cycles.



TEST DESCRIPTION : 2.8. Electrical ageing test

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TEST RESULTS

After the value records boards, an analysis board of the test results can be found, calculated according to the formulas given in the standard C 33-004 dated April 1997.

Acceptance criteria of the standard C 33-004 are the following :

- ◇ relative initial dispersion of resistances :

$$\delta \leq 0,30$$

- ◇ stability of resistances (on the 11th last measures) :

$$\frac{\Delta R_j}{R_j} \leq 12\%$$

- ◇ stability of temperatures (on the 11th last measures) :

1) Around the average value \bar{d}_j

$$\bar{d}_j - 10 \leq d_j \leq \bar{d}_j + 10$$

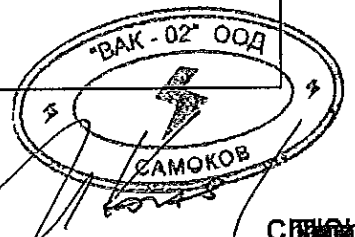
2) Connectors temperature in comparison with the reference cores

$$\theta_j \leq \text{Max } \theta_R$$

which is verified by checking that :

$$\text{Min } d_j \geq 12K$$

ВАРНО С ОПРЕДЕЛЕНИЕТО



TEST DESCRIPTION: 2.8 Electrical ageing test

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ELECTRICAL RESISTANCE RECORDS

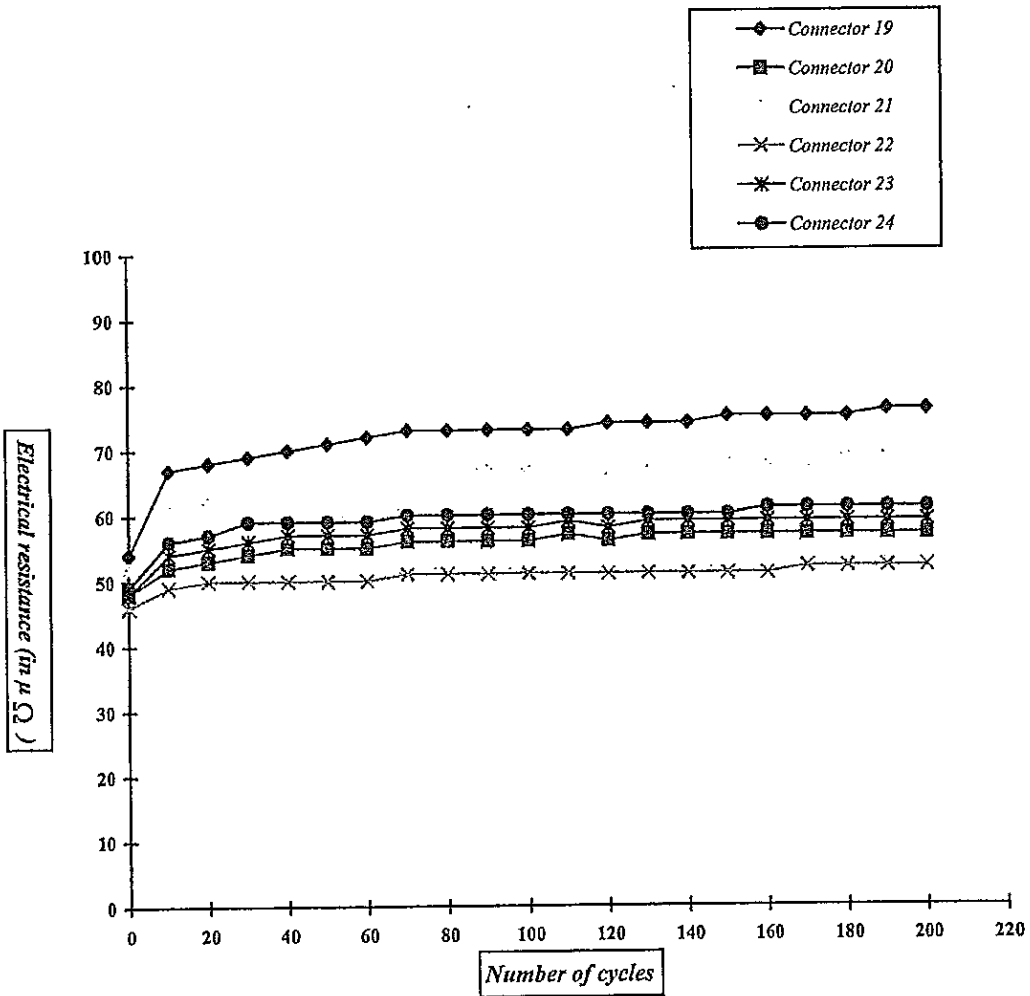
CYCLES	REAL ELECTRICAL RESISTANCE OF CONNECTORS COMPUTED OF 20°C (in $\mu\Omega$)					
	19	20	21	22	23	24
0	54	48	52	46	48	49
10	67	52	61	49	54	56
20	68	53	62	50	55	57
30	69	54	64	50	56	59
40	70	55	65	50	57	59
50	71	55	66	50	57	59
60	72	55	66	50	57	59
70	73	56	66	51	58	60
80	73	56	67	51	58	60
90	73	56	67	51	58	60
100	73	56	67	51	58	60
110	73	57	67	51	59	60
120	74	56	67	51	58	60
130	74	57	68	51	59	60
140	74	57	68	51	59	60
150	75	57	68	51	59	60
160	75	57	68	51	59	61
170	75	57	68	52	59	61
180	75	57	69	52	59	61
190	76	57	69	52	59	61
200	76	57	69	52	59	61

ВАРНО С ОРМЕТАЖА

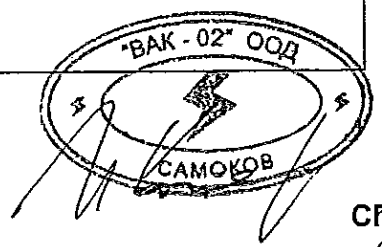


TEST DESCRIPTION : 2.8 Electrical ageing test

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ВАШЕ С ОПИТАНАТА



TEST DESCRIPTION : 2.8 Electrical ageing test

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**TEMPERATURE
RECORDS**

CYCLES	CONNECTORS TEMPERATURE (in °C)						REFERENCE CORES TEMPERATURE (in °C)		ROOM TEMPERATURE (in °C)
	19	20	21	22	23	24	MAIN	TAP	
1	74,3	76,1	71,2	73,8	70,2	72,7	119,7	116,5	26,3 *
10	69,8	71,7	67,8	69,1	66,3	69,9	118,8	110,0	25,6
20	69,8	71,0	66,9	68,5	65,5	70,3	120,3	110,2	25,4
30	71,7	72,0	68,4	71,0	67,3	70,2	121,3	111,8	26,2 *
40	71,7	74,4	69,1	70,7	67,4	71,1	121,2	114,3	24,2
50	70,6	72,5	66,9	67,8	66,5	70,1	119,3	111,4	22,6
60	71,1	72,7	67,6	68,8	66,8	70,4	120,8	113,1	23,2
70	70,1	70,9	65,4	69,3	64,9	67,4	120,4	112,3	21,9
80	69,0	71,3	66,0	68,1	65,0	67,2	120,0	111,0	22,9
90	70,3	71,8	67,6	69,8	66,4	68,5	120,7	113,6	22,9
100	71,2	72,3	68,2	70,7	66,7	68,7	119,1	114,5	22,2
110	72,6	73,7	69,3	71,7	67,7	70,1	120,4	115,6	24,1
120	71,3	72,5	68,5	70,6	67,2	69,1	120,1	114,5	22,4
130	71,7	72,4	68,4	70,7	67,2	69,0	120,3	113,3	23,9
140	72,9	74,5	70,2	72,3	68,9	70,8	119,8	116,5	23,5
150	73,1	74,4	70,3	73,0	68,9	70,6	121,4	117,0	23,8
160	73,2	74,9	70,8	72,8	69,3	71,4	119,2	116,1	24,2
170	69,9	71,3	66,9	68,5	65,7	67,9	118,9	110,5	22,8
180	72,9	74,3	69,8	72,3	68,8	70,3	120,6	115,7	23,8
190	71,5	71,3	67,6	70,7	66,3	68,4	118,2	111,8	23,7
200	71,9	72,0	68,1	70,9	66,3	68,7	119,1	113,0	23,1

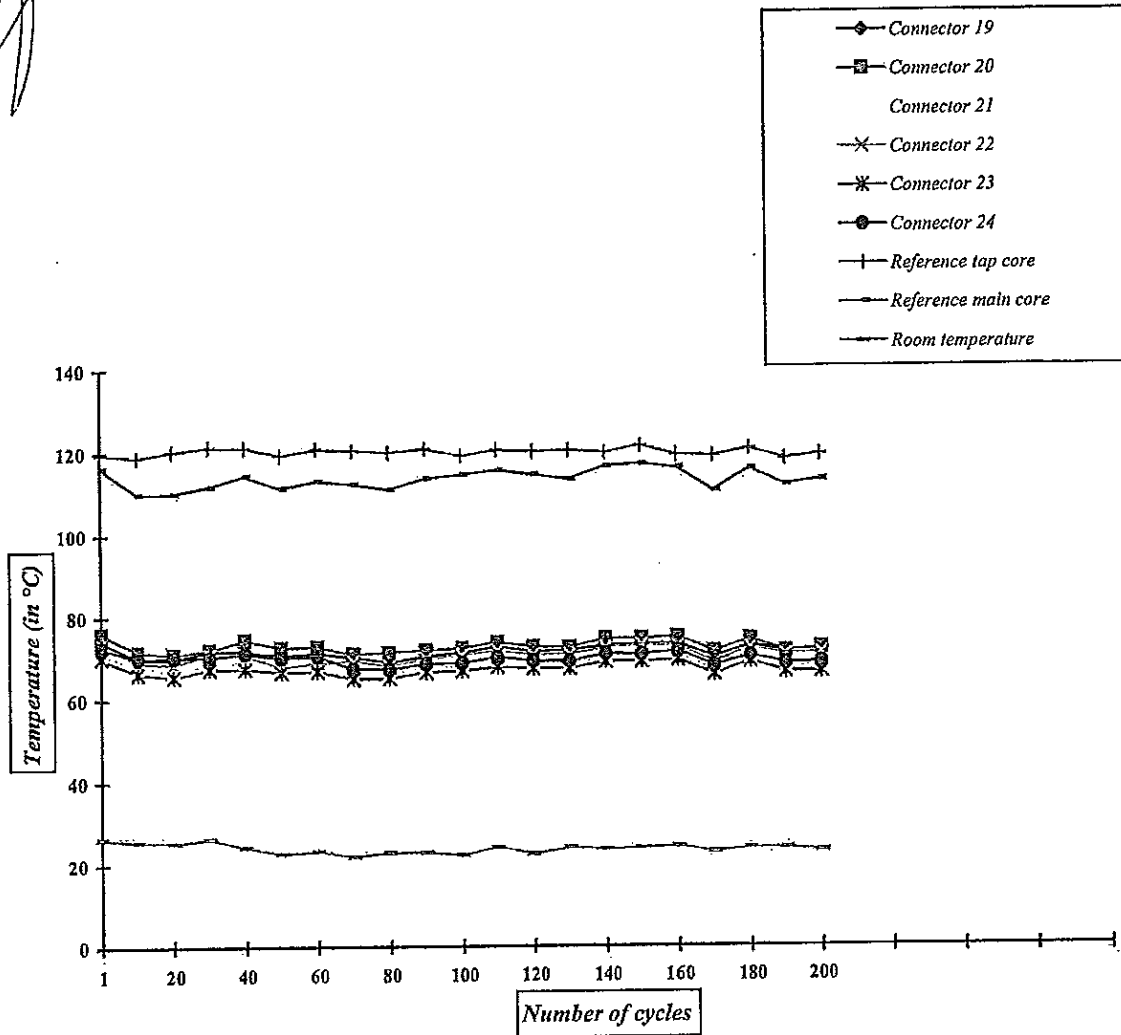
* Temperature higher than 26°C which has justified the opening of an irregularity sheet n° 15 on the 07/11/1997.

ВАРНО С ОРГАНИЗАЦИЯ

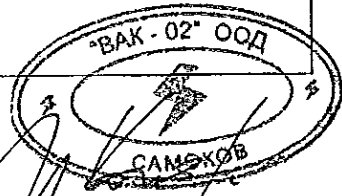


TEST DESCRIPTION : 2.8: Electrical ageing test

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ВЯРНО С ОРГАНИЗАЦИЯТА



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RESULTS ANALYSIS

Initial dispersion : $\delta = 0,10$

N° OF SAMPLE	$\frac{\Delta R_j}{R_j}$	$\bar{d}_j - 10$ (en K)	Min d_j (en K)	Max d_j (en K)	$\bar{d}_j + 10$ (en K)	COMMENTS
19	0,040	37,7	46,0	49,0	57,7	Satisfactory
20	0,018	36,7	44,3	47,9	56,7	Satisfactory
21	0,029	40,8	48,4	52,0	60,8	Satisfactory
22	0,019	38,5	46,4	50,4	58,5	Satisfactory
23	0,017	42,2	49,9	53,2	62,2	Satisfactory
24	0,017	40,2	47,8	51,3	60,2	Satisfactory

ВЯРНО С ОРГАНИЗАЦИЯТА



**СПИСЪК НА ОТДЕЛНИТЕ ИЗПИТВАНИЯ ЗА КЛЕМА СГРАДНО
ОТКЛОНЕНИЕ ТИП К 324**

1. № на тест: 061-97-36-04

2.3.1 Проверка на електрическата връзка, срязване на главата на болта и механични характеристики на клемата	5
2.3.2 Тест за ефекта от прилагане на механична сила при затягането върху главния проводник.....	6
2.3.3 Проверка на механичната якост на отклонителните проводници	7
2.4 Тест под напрежение и водонепромокаемост	8
2.5 Тест за инсталиране при ниска температура	9
2.6 Тест за стареене под въздействието на климатичните условия.....	10
2.8 Тест за стареене под въздействието на електричество.....	12

Съставил

На основание чл. 2
от ЗЗЛД



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Laboratoire d'essais
Direction Etudes et Recherches

Test report : Installation test at low temperature
Test number : 96 09 190
Product brand : SICAME
Product type : TTD 151 AFA

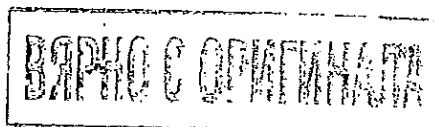
Demandeur of the test : DER
Starting date of the test : 20/09/1996
Report emission date : 11 JUN 2003
According to standard : C 33-020 (July 94)
This report contains : 3 pages and 0 annex

Conclusion : The tested SICAME LV insulation piercing connectors type TTD 151 AFA conform to the requirements of C 33-020 (July 94) standard but with a -40°C temperature.

This is an English translation. The original French test report is the only reference version

На основание чл. 2
от ЗЗЛД

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3 Test

Connectors are tested according to C 33-020 (July 94) .

3.1 Procedure

Connectors are loosely installed on the main core and on the tap core with stranded conductor corresponding to the smallest and largest cross-sections on the main core and to the largest cross-section on the tap core.

Connectors are placed in an enclosure kept at $(-40 \pm 2)^{\circ}\text{C}$.

After 1 h, while still inside the enclosure, connectors are tightened with a torque of 0,7 times the minimum torque indicated by the manufacturer.

3.2 Preparation

Connectors number 1 and 2 are mounted with 25 mm² cross main section and 35 mm² cross tap section.

Connectors number 3 and 4 are mounted with 95 mm² cross main section and 35 mm² cross tap section.

4 Results

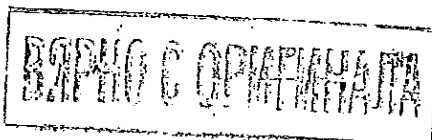
	Standard requirements	Results
Low temperature chamber	Between -38 and -42°C	- 38,6°C
Closure of the electrical circuit torque (Nm)	Minimum torque : 0,7 × 14 so 9,8	Connector 1 : 8,0 Connector 2 : 6,0 Connector 3 : 8,7 Connector 4 : 9,2
Shearhead breakdown torque (Nm)	/	Connector 1 : 17,2 Connector 2 : 18,5 Connector 3 : 18,9 Connector 4 : 17,3
Connector breakdown torque (Nm)	/	Connector 1 : 30,6 Connector 2 : 39,5 Connector 3 : 35,5 Connector 4 : 39,1

Connectors and cables are installed in the enclosure at $(- 40 \pm 2)^{\circ}\text{C}$. Connectors have been taken out and tightened in time less than 2 minutes at ambient temperature.

5 Requirement

The indicator indicates the closure of the electrical circuit before 0,7 times the minimum torque.

Visa
Supervisor
Of the test





sicame

Laboratoire d'essais
Direction Etudes et Recherches

Test report : Climatic ageing Test
Test number : 0604430
Product brand : SICAME
Product type : TTD151A FA

Demander of the test : SICAME DER

Starting date of the test : 12/04/2006

Report emission date : 22 JUN 2006

According to standard : NFC 33 020 § 2.6 (june 98)

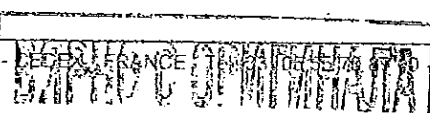
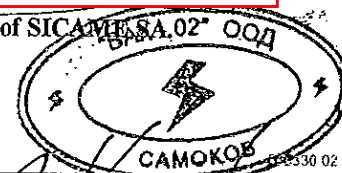
This report contains : 4 pages and 1 annex

Conclusion : The tested SICAME LV insulation piercing connectors type TTD151A FA conform to the requirements of NFC 33 020 § 2.6 (june 98) standard.

This is an English translation. The original French test report is the only reference version

На основании чл. 2
от 33ЛД

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3 Test procedure

Connectors are tested according to NFC 33 020 § 2.6 (june 98) standard.

3.1 Procedure

Connectors are tightened up to the minimum torque indicated by the manufacturer. They are mounted on the smallest and largest cross-sections on the main core and to the smallest cross-section on the tap core.

The assembly of connector and cores, maintained in a rigid and appropriate way, is placed at the bottom of a water tank. The water height is 30 cm measured from the upper part of the connector, and the cores are long enough out of the water to avoid flashover. The resistivity of the water is less than 200 Ωm and its temperature is recorded for information.

The voltage generator is tripping for a leakage current of (10,0 +/- 0,5) mA.

After 30 min under the water, the voltage test is applied to the sample with a 6 kV a.c. voltage for 1 minute .

The a.c. voltage is applied to a rate of approximately 1 kV/s.

The samples are submitted to the climatic ageing test according to NF C 20-540 with the following details :

- 6 weekly cycles are required at the enclosure temperature (70 \pm 2) $^{\circ}\text{C}$ for phases A and C .

After the climatic ageing cycles, the following voltage tests are carried out:

The connectors and the adjacent parts of core horizontally disposed are covered by 1 cm to 2 cm without mechanical stress of metallic balls. After at least 1 min, a voltage test at 6 kV is carried out for 1 min between the core conductors and the metallic balls. The a.c. voltage is applied to a rate of approximately 1 kV/s. The voltage generator shall trip for a leakage current of (10,0 \pm 0,5) mA.

No flashover shall occur (tripping of voltage generator).

The set formed by the connector and the tap core is taken out of the balls without mechanical stress. The voltage test before the climatic ageing test is carried out, but with a voltage of 1 kV.

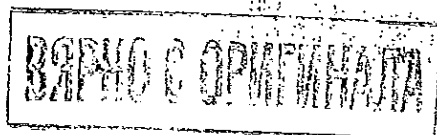
No flashover shall occur (tripping of voltage generator).

3.2 Preparation

Connectors number 1 and 2 are mounted with 35 mm² cross main section and 16 mm² cross tap section.

Connectors number 3 and 4 are mounted with 70 mm² cross main section and 16 mm² cross tap section.

На основание чл. 2
от ЗЗЛД



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sicame

Laboratoire d'essais
Direction Etudes et Recherches

Test report	: Checking electrical continuity, shearheads and mechanical behaviour of the connector
Test number	: 01 09 280
Product brand	: SICAME
Product type	: TTD 151 AFA

Demandeur of the test : Commercial direction

Starting date of the test : 25/09/2001

Report emission date : **04 OCT. 2001**

According to standard : NFC 33 020 § 2.3.1 (june 98)

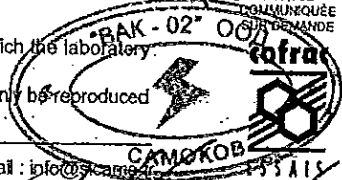
This report contains : 3 pages

Conclusion : The SICAME LV insulation piercing connectors type TTD 151 AFA (with Czech cables) conform to the requirements NFC 33 020 § 2.3.1 (june 98).

This is an English translation. The original French report test is the only reference version

На основании чл. 2
от 33ЛД

Accreditation 1-1068. Scope on request.
The Cofrac testing section accreditation ensures the competence of the laboratory staff for the tests for which the laboratory has qualified.
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ВЪВЕДЕНИЕ С ОПИТИВАНАТА



Laboratoire d'essais
LABEP



Rapport d'essai : Essai de corrosion
Test report : Corrosion test

Rapport d'essai n°	: 1101491	Test report n.	: 1101491
Constructeur	: SICAME	Product brand	: SICAME
Référence produit	: TTD151AFA	Product type	: TTD151AFA
Demandeur de l'essai	: SICAME S.A.	Test applied by	: SICAME S.A.
Date d'essai	: du 26 janvier au 4 avril 2011	Date of the test	: 26 January to 4 April 2011
Date d'émission du rapport	: 24 octobre 2011	Report emission date	: 24 October 2011

Essais réalisés suivant : NF EN 50483-4 (07/2009), § 8.1.5.1
Tests carried out in accordance with

Ce rapport comprend : 6 pages
This report contains

Conclusion : Les connecteurs à perforation d'isolant SICAME de type TTD151AFA soumis à essai satisfont aux exigences du § 8.1.5.1 de la norme NF EN 50483-4 (07/2009).
Pour déclarer la conformité, il n'a pas été tenu explicitement compte de l'incertitude associée au résultat.

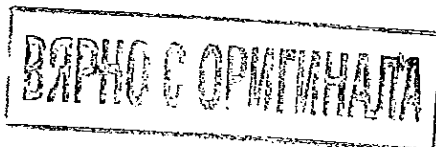
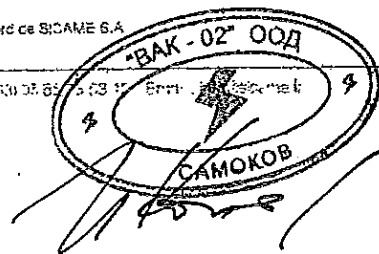
Conclusion : The tested SICAME insulation piercing connectors TTD151AFA comply with the requirements of clause 8.1.5.1 of NF EN 50483-4 (July 2009) standard.
To give a ruling on the conformity, the uncertainty associated to the result is not implicitly involved

На основание чл. 2
от ЗЗЛД

0 1000 01

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СРМ - СИСТЕМИ ЗА ОБРАЗОВАНИЕ И ОБСЛУЖИВАНЕ - ПЛОВДИВ - БЪЛГАРИЯ - ТЕЛ: 0242 86 73 89 90 - ФАКС: 0242 86 73 89 91 - Е-МАЙЛ: info@srmi.bg



1 Echantillons soumis à essai / Samples under test

Type : Connecteur à perforation d'isolant
Insulation piercing connector

Désignation / Designation : TTD151AFA

Fabricant / Manufacturer : SICAME

Numéro de lot / Batch number : 09M994320

Couples de serrage <i>Tightening torques</i>	
Minimal	13 Nm
Nominal	14 Nm
Maximal	16 Nm

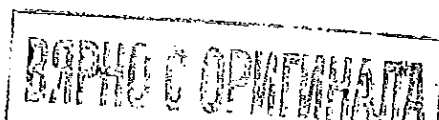
Plage de sections <i>Cross-section range</i>		
	Principal <i>Main</i>	Dérivé <i>Tap</i>
Min	16 mm ²	6 mm ²
Max	95 mm ²	35 mm ²

Classes du produit selon NF EN 50483-1 (§9.3) <i>Classes of product in accordance with NF EN 50483-1 (§9.3)</i>	
<input type="checkbox"/>	Classe A : raccords soumis aux cycles de vieillissement électrique et aux essais de court-circuit <i>Class A : connectors subjected to electrical ageing cycles and short-circuits</i>
<input checked="" type="checkbox"/>	Classe B : raccords soumis seulement aux cycles de vieillissement électrique <i>Class B : connectors subjected only to electrical ageing cycles</i>
<input checked="" type="checkbox"/>	Classe 1 : raccords soumis à l'essai de tenue diélectrique dans l'eau <i>Class 1 : connectors subjected to a.c. voltage withstand test in water</i>
<input type="checkbox"/>	Classe 2 : raccords soumis à l'essai de tenue diélectrique dans l'air <i>Class 2 : connectors subjected to a.c. voltage withstand test in air</i>

Nombre d'échantillons / Number of samples : 2
Repérage / Identification : 1, 2

Date de réception au laboratoire : le 02 décembre 2010
Reception date at the laboratory : on December, 02nd 2011

Visa du responsable de l'essai
Visa supervisor of the test



2 Caractéristiques du matériel / Equipment used during test

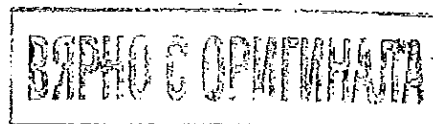
2.1 Appareillage utilisé / Equipment used

N° U.T.	Désignation / Designation	Caractéristique / Characteristic
10-00 27	Clé à couple électronique <i>Electronic torque wrench</i>	De 2,5 à 30 Nm ; Précision 4% <i>Range 2,5 to 30 Nm : Accuracy 4%</i>
02 01 76	Thermomètre indicateur <i>Indicating thermometer</i>	Précision ± 2°C <i>Accuracy ± 2°C</i>
10-00 78	Encoûte de brouillard salin <i>Salt spray enclosure</i>	Conforme à la NF EN 60068-2-11 (08/1999) <i>Compliant with NF EN 60068-2-11 (08/1999)</i>
04 00 30	Thermomètre étanche <i>Thermometer</i>	Précision ± 2 °C <i>Accuracy ± 2 °C</i>
10 03 33	pH-mètre <i>pH-meter</i>	Précision ± 0,1 pH <i>Accuracy ± 0,1 pH</i>
98 03 39	Densimètre <i>Densimeter</i>	Précision ± 0,1 % <i>Accuracy ± 0,1 %</i>
03 02 56	Chronomètre <i>Chronometer</i>	Précision ± 1 s <i>Accuracy ± 0,1 s</i>

2.2 Câbles / Cables

N° Lot / Identification	06043		
Norme / Standard	NF C 33-209		
Provenance / From	France		
Section / Cross section	6 mm ²		
Matériau de l'âme / Conductor material	<input type="checkbox"/> Cuivre <i>Copper</i>	<input checked="" type="checkbox"/> Aluminium	<input type="checkbox"/> Alliage d'aluminium <i>Aluminium alloy</i>
Type d'âme / Conductor type	<input type="checkbox"/> Massive <i>Solid</i>	<input checked="" type="checkbox"/> Câblée <i>Stranded</i>	<input type="checkbox"/> Rétreinte <i>Non compacted</i>
	<input type="checkbox"/> Rétreinte <i>Compacted</i>	<input checked="" type="checkbox"/> Non rétreinte <i>Non compacted</i>	<input type="checkbox"/> Souple <i>Flexible</i>
Forme d'âme / Conductor shape	<input checked="" type="checkbox"/> Ronde <i>Circular</i>	<input type="checkbox"/> Sectorale <i>Sector-shaped</i>	
Nb de brins / N. of wires	7		
Ø sur âme / Ø conductor	2,4 mm		
Matériau de l'isolant Insulation material	Polyéthylène réticulé type TIX-5 <i>Cross-linked polyethylene, TIX-5 type</i>		
Ø sur isolant / Ø insulation	5,6 mm		
Conditionnement Conditioned on	Le 2 novembre 2010 (1h00 à 120°C) <i>On November, 2nd 2010 (1h00 at 120°C)</i>		
Référence du câble HD626 HD626 conductor reference	4 E-1		

Visa du responsable de l'essai
The signature of the test



N° Lot / Identification	07045		
Norme / Standard	NF C 33-209		
Provenance / From	France		
Section / Cross section	16 mm ²		
Matériau de l'âme / Conductor material	<input type="checkbox"/> Cuivre Copper	<input checked="" type="checkbox"/> Aluminium	<input type="checkbox"/> Alliage d'aluminium Aluminium alloy
Type d'âme / Conductor type	<input type="checkbox"/> Massive Solid	<input checked="" type="checkbox"/> Câblée Stranded	
	<input type="checkbox"/> Rétreinte Compacted	<input checked="" type="checkbox"/> Non rétreinte Non compacted	<input type="checkbox"/> Souple Flexible
Forme d'âme / Conductor shape	<input checked="" type="checkbox"/> Ronde Circular	<input type="checkbox"/> Sectorale Sector-shaped	
Nombre de brins / Number of wires	7		
Ø sur âme / Ø on conductor	4,7 mm		
Matériau de l'isolant Insulation material	Polyéthylène réticulé type TIX-5 Cross-linked polyethylene, TIX-5 type		
Ø sur isolant / Ø on insulation	7,4 mm		
Conditionnement Conditioned on	Le 2 novembre 2010 (1h00 à 120°C) On 2 November 2010 (1h00 at 120°C)		
Référence du câble HD626 / HD626 conductor reference	4 E-1		

3 Procédure / Test procedure

Les essais sur les raccords sont effectués selon les prescriptions du paragraphe 8.1.5.1 de la norme NF EN 50483-4 (07/2009).

Connectors are tested in accordance with clause 8.1.5.1 of NF EN 50483-4 (07/2009) standard.

Les échantillons sont soumis à l'essai de corrosion suivant :

The samples are submitted to the following corrosion test :

Méthodes d'essai selon NF EN 50483-4 (§ 8.1.5.1.3) Test methods in accordance with NF EN 50483-4 (§ 8.1.5.1.3)	
<input checked="" type="checkbox"/> Essai au brouillard salin Salt mist test	
<input type="checkbox"/> Essai en atmosphère gazeuse Gas atmosphere test	<input type="checkbox"/> Méthode 1 / Method 1 <input type="checkbox"/> Méthode 2 / Method 2
<input type="checkbox"/> Essai d'immersion Immersion test	<input type="checkbox"/> Méthode 1 / Method 1 <input type="checkbox"/> Méthode 2 / Method 2

Deux échantillons sont testés conformément à la combinaison de conducteurs suivante :

Two samples shall be tested in accordance with the following conductor combination

Principal / Main	Dérivé / Branch
Min.	Min.

Le raccord est placé au milieu du conducteur principal d'une longueur de 0,5 m à 1,5 m. Il est serré au couple minimum spécifié par le fabricant.

Visa du responsable de l'essai
Visa supervisor of the test

Stamp: CAMOKOB
Signature

Stamp: ВРРНО С ОБИТВАНАТА

The connector is placed in the middle of the main core of length 0,5 m to 1,5 m. It is tightened to the minimum torque specified by the manufacturer.

4 cycles de 7 jours sont réalisés. Ce cycle consiste en 7 jours de brouillard salin comme défini à la EN 50483-6, 8.4.1.

There are 4 cycles of 7 days. This cycle consists of 7 days of salt mist as defined in 8.4.1 of EN 50483-6.

Exigences / Requirements

Un contrôle visuel est réalisé et il ne doit pas y avoir de trace significative de rouille rouge.

NOTE : une rouille significative constituerait plus de 10% de la surface exposée des pièces métalliques.

Le marquage permettant l'identification des échantillons doit être lisible quand il est examiné avec une vue normale ou corrigée, sans grossissement.

Aucune détérioration des raccords pouvant nuire à leur bon fonctionnement ne doit se produire.

Pour un raccord conçu avec une tête fusible, il doit être possible de le démonter avec un couple inférieur ou égal au couple maximal spécifié par le fournisseur.

Visual inspection is carried out and there shall be no significant trace of red rust.

NOTE : Significant rusting would constitute more than 10 % of the exposed surface area of the metallic parts.

The sample's identification marking shall be legible when examined with normal or corrected vision, without magnification.

No deterioration of the connectors shall occur which would impair their normal function.

For a connector designed with a shear-head it shall be able to be removed with a torque below, or equal to, the manufacturer's specified maximum torque.

3.1 Conditions ambiantes / Ambient conditions

Les conditions ambiantes relevées lors de l'essai sont les suivantes :

Ambient conditions when performing the test are as follows :

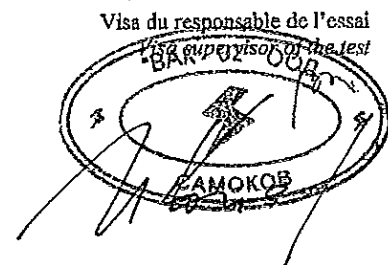
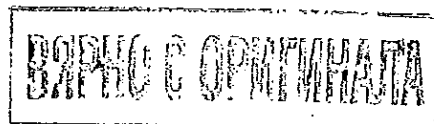
	Exigences Requirements	Relevés Results
Température ambiante et humidité Ambient temperature and humidity conditions	15 °C ≤ T° ≤ 30 °C 25 % ≤ HR ≤ 75 %	22 °C 35 %HR

3.2 Configuration des échantillons / Samples configuration

Echantillon n° Sample n.	Section/ Cross section (mm²)	
	Câble principal Main cable	Câble dérivé Tap cable
1	16	6
2		

3.3 Relevés des couples de serrage / Tightening torque values

Echantillon n° Sample n.	Couples de serrage Tightening torques (Nm)
1	13,08
2	13,31



4 Exigences / Requirements

	Exigences / Requirements	Relevés / Results
Concentration de NaCl / NaCl concentration (%)	5 ± 1	Min : 4,7 Max : 5,3
Valeur du pH pH value	Entre 6,5 et 7,2 Between 6,5 and 7,2	Min : 6,6 Max : 7,0
Nombre de cycles en brouillard salin Number of cycles in salt spray	4 × 168 h	4 × 168 h
Volume récolté / collected volume (mL)	Entre 1,0 et 2,0 mL par heure Soit entre 168 et 336 mL Between 1,0 and 2,0 mL per hour i.e. between 168 and 336 mL	Min : 294 Max : 318,9

5 Résultats / Results

	Exigences / Requirements	Rélevés / Results
Surface de rouille rouge Surface area of red rust	< 10 %	Echantillon 1 / sample 1 : 0 % Echantillon 2 / sample 2 : 0 %
Marquage Identification marking	Lisible Legible	Echantillon 1 / sample 1 : Ok Echantillon 2 / sample 2 : Ok
Couple de desserrage (Nm) Removal torque (Nm)	< 16	Echantillon 1 / sample 1 : 4,90 Echantillon 2 / sample 2 : 4,60

6 Conclusion / Conclusion

Un contrôle visuel est réalisé et il n'y a pas de trace significative de rouille rouge.

NOTE : une rouille significative constituerait plus de 10% de la surface exposée des pièces métalliques.

Le marquage permettant l'identification des échantillons est lisible quand il est examiné avec une vue normale ou corrigée, sans grossissement.

Aucune détérioration des raccords pouvant nuire à leur bon fonctionnement ne s'est produit.

Pour un raccord conçu avec une tête fusible, il est possible de le démonter avec un couple inférieur ou égal au couple maximal spécifié par le fournisseur.

Visual inspection is carried out and there isn't significant trace of red rust.

NOTE : Significant rusting would constitute more than 10 % of the exposed surface area of the metallic parts.

The sample's identification marking is legible when examined with normal or corrected vision, without magnification.

No deterioration of the connectors is occurred which would impair their normal function.

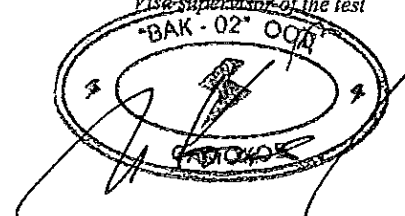
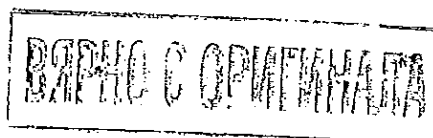
For a connector designed with a shear-head it is able to be removed with a torque below, or equal to, the manufacturer's specified maximum torque.

FIN DU RAPPORT D'ESSAI / END OF TEST REPORT

Visa du responsable de l'essai

Visa supervisor of the test

BAK - 02 OCA

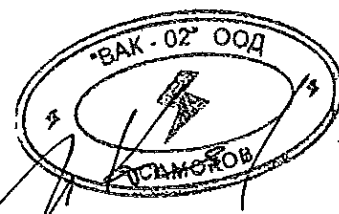


**СПИСЪК НА ОТДЕЛНИТЕ ИЗПИТВАНИЯ НА ИЗОЛИРАНА КЛЕМА
ТИП TTD 151 AFA**

1. № на тест: 9609190 - Тест за инсталиране при ниска температура;
2. № на тест: 0604430 - Тест за стареене под въздействие на климатични условия;
3. № на тест: 0109280 - Проверка на електрическата връзка, срязване на главата на болта и механични характеристики на клемата;
4. № на тест: 1101491 - Тест за корозия.

Съставил: /

На основание чл. 2
от ЗЗЛД



7/13

MICHAUD

MATERIEL ELECTRIQUE

BP 11 - Z.I. LE BLANCHON - 01160 PONT D'AIN - (FRANCE)

LABORATOIRE D'ESSAIS
TEST LABORATORY

Date : 30/10/95

Date : 30/10/95

RAPPORT D'ESSAIS TEST REPORT

ESSAI DIELECTRIQUE

SUR CONNECTEUR CB2p/CT 150 (K390)

N° 061-95-43-02

VOLTAGE TEST

ON CB2p/CT 150 (K390) CONNECTOR

N° 061-95-43-02

DEMANDEUR : Bureau d'Etudes MICHAUD SA
REQUESTED BY : MICHAUD SA's Research Department

PRESENTATION : Ce document présente des essais de contrôle diélectrique et d'étanchéité réalisés sur des connecteurs CB2p/CT 150 de fabrication MICHAUD SA.

Les modalités de cet essai s'inspirent de celles de la norme C 33-020 de Juillet 1994.

INTRODUCTION : This document reports on voltage and watertightness tests carried out on MICHAUD's CB2p/CT 150 connectors.

The test procedures are taken from those described in the C 33-020 standard dated July 1994.

На основании чл. 2
от 33ЛД

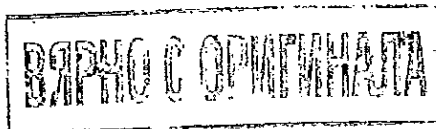
DIFFUSION : Le 30/10/1995 - 1 exemplaire original UR (LE)
Le 18/02/2011 - 1 exemplaire original COM (Classement Client)

ISSUANCE : On the 30/10/1995 - 1 original to UR (LE)
On the 18/02/2011 - 1 original to COM (Customer Filing)

Toute reproduction de ce rapport d'essais n'est autorisée que sous la forme de fac-similé photographique intégral après autorisation écrite du laboratoire d'essais de MICHAUD S.A. Le présent rapport d'essais ne concerne que les échantillons soumis à l'essai.

Any copy of this test report is authorized only as a complete photographic facsimile after written authorization from the test laboratory of MICHAUD. The test report hereafter concerns only the samples tested.

Ce document comporte 4 pages (y compris la présente page 1).
This document includes 4 pages (including this page 1).



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CONTENTS

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I) <u>INTRODUCTION</u>	3
1.1 Subject	3
1.2 Tested products	3
II) <u>STANDARD DOCUMENTS REFERRED TO IN THIS TEST REPORT</u>	3
III) <u>GENERAL CONDITIONS</u>	3
IV) <u>TESTS</u>	3
Voltage and watertightness test	4

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ВЪРНО С ОПРИГНАЛАТА



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I) INTRODUCTION

1.1. Subject

This document reports on voltage and watertightness tests carried out on MICHAUD's CB2p/CT150 connectors.

The test procedures are taken from those described in the C 33-020 standard dated July 1994.

A test sheet gathers procedures and results of the test.

1.2. Tested products

It concerns connectors K 390, CB2p/CT150, in conformance with our current production, but including the following modifications, in order to improve the voltage strength :

- insulation of the rod on the tap side : polyolefin instead of PVC,
- body of the tap : polypropylene instead of polyamid,
- inlets on the tap side : addition of neutral grease.

The batch n° of the tested products is 95.42.00.

II) STANDARD DOCUMENTS REFERRED TO IN THIS REPORT

French standards

C 33-020 : July 1994,
«Insulated cables and their accessories for power systems - Insulation piercing branch - connectors for overhead distributions and services of rated voltage 0,6/1kV with insulated bundled cores».

NF C 33-209 : September 1988 + addition 2 of August 1993,
«Insulated or protected cables for networks ABC cables for nominal voltage 0,6/1kV overhead networks».

III) GENERAL CONDITIONS

• Temperature

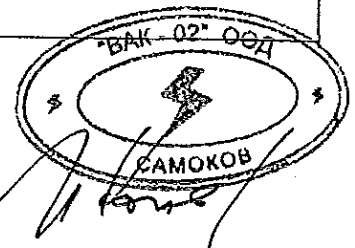
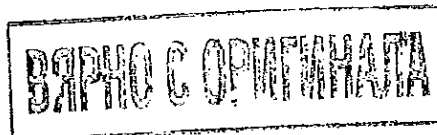
Test is carried out at the room temperature of the test laboratory.

• Conductors used

STANDARD REFERENCE	NOMINAL CROSS-SECTIONAL AREA (in mm ²)	SHAPE AND COMPOSITION OF CONDUCTOR	Ø OVER INSULANT (in mm)	NAME OF MANUFACTURER
/	16	- circular - copper	6,2 to 6,5	From IEC (received in 09,95)
/	10	- circular - copper	5,6 to 5,9	From IEC (received in 09,91)
NF C 33-209	150	- circular - copper	17,5	Câblerie de Lens

IV) TESTS

On the following pages, there is the sheet concerning the test performed.



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TEST DESCRIPTION : Voltage and watertightness tests

Page 1/1

DATE : 25/10/1995

PLACE : MICHAUD laboratory in ST JULIENSURAN

OPERATOR : H. MATHEZ
JP. ROPY

N° OF SAMPLES : 1 to 4

TEST EQUIPMENTS

N°

PROCEDURES

TITLE

- Dielectric test equipment A894 (BIPLEX)
- Dynamometric equipment GRIN 15N.m and 70N.m

- 1 General
- 1 General

TEST CONDITIONS

General conditions

PROCEDURES

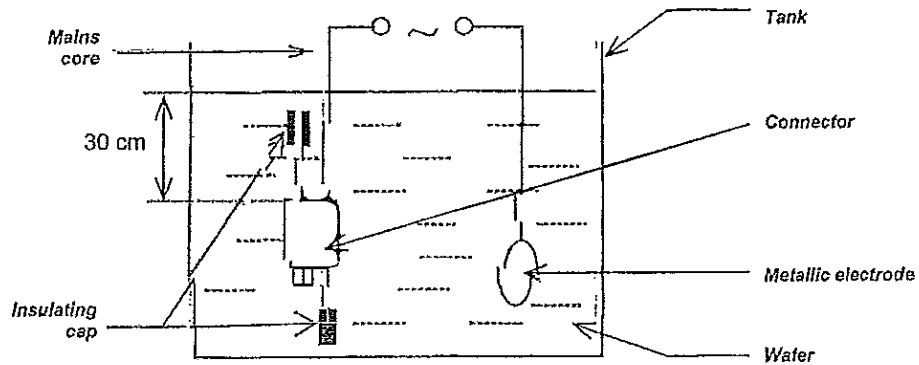
Connectors are fitted on a 150mm² aluminium mains core and on a 16mm² or 10mm² copper tap core.

The unused screw of the 2nd tapping is unscrewed.

Applied tightening torque on mains is 13,5N.m and 9N.m on the tap.

A voltage and watertightness test is performed on the assembly : connectors and main and tap cores.

The assembly is put under water as follows, after insulating caps have been fitted on the core ends :



After 30 minutes in water, a voltage of 6kV at 50Hz during 1 minute is applied.

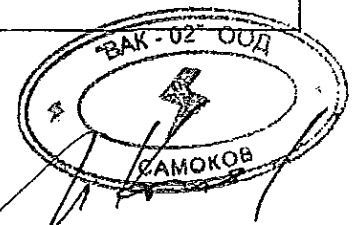
No breakdown shall occur during this test

Then, voltage is increased up to breakdown.

TEST RESULTS

N° OF SAMPLES	TAP CORE CROSS-SECTIONAL AREA (in mm ²)	COMMENTS AFTER 30 MIN UNDER WATER AND 1 MIN UNDER 6 kV	BREAKDOWN	
			VALUE (in kV)	PLACE
1	16	Satisfactory	10	US welding
2	16	Satisfactory	12	Inlet of gasket tap side
3	10	Satisfactory	8	Inlet of gasket tap side
4	10	Satisfactory	12	Screw way tap side

ВЪРНО С ОРМИНАЛАТА



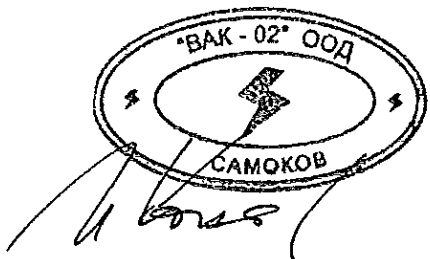
**СПИСЪК НА ОТДЕЛНИТЕ ИЗПИТВАНИЯ ЗА КЛЕМА ДВЕ ОТКЛОНЕНИЯ -
К 390**

1. № на тест: 061-95-43-02

Тест под напрежение и тест за водонепропускливост.....4

Съставил:

На основание чл. 2
от ЗЗЛД



LABORATOIRE D'ESSAIS
TEST LABORATORY

RAPPORT D'ESSAIS TEST REPORT

ESSAIS DE QUALIFICATION DU
CBS/CT 35 (K222)
N° 130-11-34-04

QUALIFICATION TEST OF
CBS/CT 35 (K222)
N° 130-11-34-04

06/01/2012

DEMANDEUR : Bureau d'Etudes MICHAUD SA

REQUESTED BY: MICHAUD SA's Research Department

PRESENTATION : Ce document regroupe les essais de qualification du connecteur CBS/CT 35 (K222). Les matériels testés sont des connecteurs de MICHAUD SA.
Les modalités d'essais retenues sont celles de la norme NF EN 50483-4 de Juillet 2009.

INTRODUCTION : This document gathers the internal qualification tests of connector CBS/CT 35 (K222). Tested products are of MICHAUD's connectors.
The test procedures are the ones of the standard NF EN 50483-4 dated July 2009.

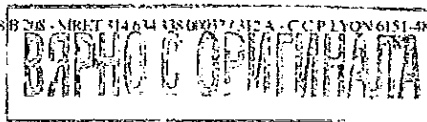
На основание чл. 2
от ЗЗЛД

DIFFUSION : Le 06/01/2012 - 1 exemplaire original UR (LE)
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Any copy of this test report is authorized only as its complete content after written authorization from the test laboratory of MICHAUD SA. The test report hereafter concerns only the samples tested.

Seule la version française fait foi. The French version is legally acceptable.

Ce document comporte 22 pages (y compris la présente page 1).
This document includes 22 pages (including this page 1).



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ВАРНО С ОРГАНИЗАТА



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7.9a

1) INTRODUCTION

1.1 Subject

This document gathers the qualification tests of connector CBS/CT 35 (K222). Tested product is of MICHAUD's manufacture.

Test procedures are the ones of Standard NF EN 50483-4 dated July 2009.

For each test, there is a test sheet gathering corresponding procedures and results.

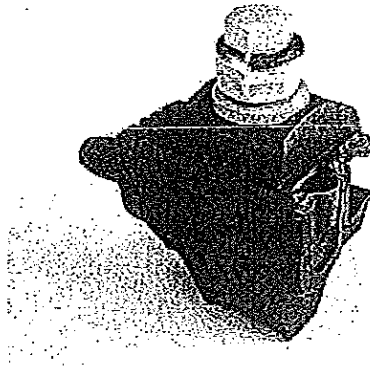
1.2 Tested products

Tested product is service single pole connector CBS/CT for aerial conductors, according to technical file "CBS EXP".

This product is coming from an industrial pilot series and have been received at the Test Laboratory on 07/09/2011.

DESIGNATION	CODE	BATCH N°
CONNECTOR CBS/CT 95 AL HEAD	K222	11 15 67

Connector CBS/CT 95

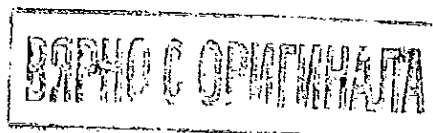
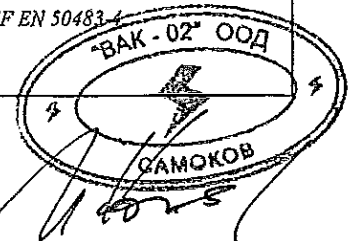


1.3 Order of tests

Samples are numbered from 1 up to 50.

SAMPLES N°	TESTS
1 up to 6	8.1.2.1 Test for mechanical damage to main conductor
7 up to 10	8.1.2.2 Branch cable pull-out test
11 up to 16	8.1.2.3 Connector bolt tightening test
17 up to 28	8.1.2.4 Shear head function test
29 up to 32	8.1.2.5 Low temperature impact test
33 up to 38	8.1.4 Low temperature assembly test
39 and 40	8.1.5.1 Corrosion tests
41 up to 44	8.1.3.1.3.2 Test in air 8.1.5.2 Climatic ageing test 8.1.3.1.3.2 Test in air
45 up to 50	9.2 Test for permanent marking 8.1.6 Electric ageing test

Remark : Tests numbers are the ones of paragraphs corresponding to Standards NF EN 50483-1 and NF EN 50483-4



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II) STANDARD DOCUMENTS REFERRED TO IN THIS REPORT

- French standards

- NF EN 60529 : October 1992 + Additive 1 dated June 2000,
(Filing C 20-010) "Degree of protection provided by enclosures (IP Code)".
- NF C 32-321 : April 1982 + Additive 1 dated April 1993,
"Insulated cables and flexible cords for installation - Cross-linked polyethylene insulated cables covered with polyvinyl chloride sheath - Series U - 1000 R2V".
- NF EN 50483-1 : July 2009,
(Filing C 33-045-1) "Test requirements for low voltage aerial bundled cable accessories - Part 1 : Generalities".
- NF EN 50483-4 : July 2009,
(Filing C 33-045-4) "Test requirements for low voltage aerial bundled cable accessories - Part 4 : Connectors".
- NF EN 50483-5 : July 2009,
(Filing C 33-045-5) "Test requirements for low voltage aerial bundled cable accessories - Part 5 : Electrical ageing test".
- NF EN 50483-6 : July 2009,
(Filing C 33-045-6) "Test requirements for low voltage aerial bundled cable accessories - Part 6 : Environmental testing".
- NF C 33-209 : July 1996,
"Insulated or protected cables for power systems - Bundle assembled cores for overhead systems of rated voltage 0,6/1kV".

III) GENERAL CONDITIONS

• **Temperature**

Tests are performed at the room temperature of Test Laboratory comprised between 20°C and 26°C.

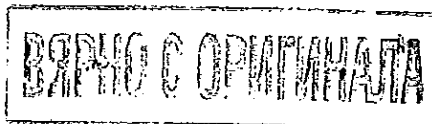
• **Conductors used**

STANDARD	MANUFACTURER NAME	NOMINAL CROSS-SECTIONAL AREA (in mm ²)	STRANDS NUMBER AND CORE COMPOSITION	INSULANT NATURE	Ø OVER INSULANT (in mm)	Ø OVER CORE (in mm)	MINIMAL BREAKING LOAD (in daN)
/	/	95	19 Aluminium strands	XLPE	15,1	11,1	1 140
NF C 33-209	NEXANS	35	7 Aluminium strands	XLPE	10,6	7,1	420
	NEXANS	16	7 Aluminium strands	XLPE	7,3	4,8	190
NF C 32-321	NEXANS	2,5	Copper massive	XLPE	3,1	1,6	75

Before tests, conductors are conditioned, according to § 7.2 of Standard NF EN 50483-4, as follows : they are put in an enclosure during 1 h at 120°C, then the door of enclosure is opened so that conductors could come back to room temperature.

IV) TESTS

On the following pages, sheets of each performed test can be found.



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TEST DESCRIPTION : 8.1.2.1 Test for mechanical damage to main conductor

Page 1/1

DATE : ON 24/10/2011

PLACE : MICHAUD SA Test Laboratory

OPERATOR : JP. ROPY

N° OF SAMPLES : 1 up to 6

TEST EQUIPMENTS :

- Dynamometric equipment GRIN 15N.m and 70N.m
- Mechanical tensile strength and endurance bench

PROCEDURES

Procedures and acceptance criteria are the ones of § 8.1.2.1 of Standard NF EN 50483-4.

Main conductor is strained. Tensile strength on the core is the following one :

- * 240 N for 16 mm² aluminium conductor,
- * 1 420 N for 95 mm² aluminium conductor.

Connector is tightened for 15 seconds on this main conductor and on tap conductor up to maximal torque, i.e. 16,5 N.m.

Then, an increasing tensile strength is applied on the main conductor core, with a progress comprised between 1 000N/min and 5 000N/min up to the following values :

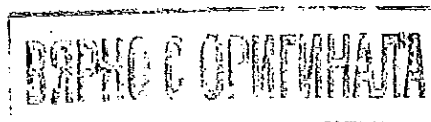
- 1 140 N for 16 mm² aluminium conductor,
- 6 840 N for 95 mm² aluminium conductor.

Strength is maintained for one minute.

No breakage of the conductor core should occur during the tensile strength application.

TEST RESULTS

CONNECTORS TYPE	SAMPLE N°	CONDUCTORS SECTION (in mm ²)		STRENGTH APPLIED FOR 1 MIN (in daN)	COMMENTS AFTER 1 MIN OF STRENGTH APPLICATION
		MAIN	TAP		
CBS/CT 95	1	95	35	6 840	Satisfactory
	2	95	35	6 840	Satisfactory
	3	16	2,5	1 140	Satisfactory
	4	16	2,5	1 140	Satisfactory
	5	16	35	1 140	Satisfactory
	6	16	35	1 140	Satisfactory



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MICHAUD SA
TEST LABORATORY

TEST REPORT
QUALIFICATION TESTS OF CBS/CT 35 (K222)
N° 130-11-34-04

Date : 06/01/2012
Page : 6/22

TEST DESCRIPTION : 8.1.2.2 Branch cable pull-out test

Page 1/1

DATE : ON 25/10/2011

PLACE : MICHAUD SA Test Laboratory

OPERATOR : JP. ROPY

N° OF SAMPLES : 7 up to 10

TEST EQUIPMENTS :

- Dynamometric equipment GRIN 15N.m and 70N.m
- Mechanical tensile strength and endurance bench
- Dimension metrology

PROCEDURES

Procedures and acceptance criteria are the ones of § 8.1.2.2 of Standard NF EN 50483-4.

Connector is tightened for 15 seconds on main conductor and tap conductor up to maximal torque, i.e. 16,5 N.m.

A marking is performed on conductor insulant at connector end level, in order to measure an eventual sliding of conductor in relation to connector.

Then, assembly connector - conductor is installed between clamping jaws of tensile strength machine. An increasing tensile strength is applied on tap conductor core, with a progress comprised between 100 N/min and 500 N/min up to 75 N for 2,5 mm² copper conductor.

This strength is maintained for 1 minute.

No breakage or damage of conductor should occur during the strength application, and sliding of conductor should not exceed 3 mm.

TEST RESULTS

CONNECTORS TYPE	SAMPLE N°	CONDUCTORS SECTION (in mm ²)		STRENGTH APPLIED FOR 1 MIN (in N)	COMMENTS AFTER 1 MIN OF STRENGTH APPLICATION
		MAIN	TAP		
CBS/CT 95	7	16	2,5	75	Satisfactory
	8	16	2,5	75	Satisfactory
	9	95	2,5	75	Satisfactory
	10	95	2,5	75	Satisfactory

ВАРНО С ОПРИЗНАТА



TEST DESCRIPTION : 8.1.2.3. Connector bolt tightening test

Page 1/1

DATE : ON 26/10/2011

PLACE : MICHAUD SA Test Laboratory

OPERATOR : JP. ROPY

N° OF SAMPLES : 11 up to 16

TEST EQUIPMENTS

- Dynamometric equipment GRIN 15N.m and 70N.m
- Mechanical tensile strength and endurance bench

PROCEDURES

Procedures and acceptance criteria are the ones of § 8.1.2.3 of Standard NF EN 50483-4.

Main conductor is strained. Tensile strength of the core is the following one :

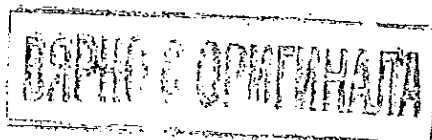
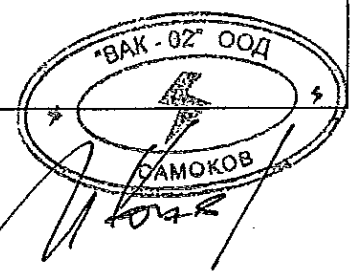
- * 380 N for 16 mm² aluminium conductor,
- * 2 280 N for 95 mm² aluminium conductor.

Connector is fitted on this strained main conductor and on tap conductor. It is tightened up to 1,2 times the maximal torque, i.e. $1,2 \times 16,5 = 19,8 \text{ N.m}$.

No breakage or damage of connector should occur.

TEST RESULTS

CONNECTORS TYPE	SAMPLE N°	CONDUCTORS SECTION (in mm ²)		STRENGTH APPLIED ON MAIN CONDUCTOR (in N)	BREAKING TORQUE OF SHEAR HEADS (in N.m)	COMMENTS AFTER TIGHTENING 1,2 TIMES THE MAXIMAL TORQUE
		MAIN	TAP			
CBS/CT 95	11	95	35	2 280	15,9	Satisfactory
	12	95	35	2 280	15,0	Satisfactory
	13	16	2,5	380	15,2	Satisfactory
	14	16	2,5	380	15,7	Satisfactory
	15	16	35	380	14,8	Satisfactory
	16	16	35	380	15,0	Satisfactory



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TEST DESCRIPTION: 8.1.2.4 Shear head function test	Page 1/1
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DATE: ON 27/10/2011 AND 28/10/2011 PLACE: MICHAUD SA Test Laboratory	OPERATOR: JP. ROPY
---	---------------------------

N° OF SAMPLES: 17 up to 28

TEST EQUIPMENTS:

- Dynamometric equipment GRIN 15N.m and 70N.m
- Enclosure with regulated temperature -25°C / +70°C

PROCEDURES

Procedures and acceptance criteria are the ones of § 8.1.2.4 of Standard NF EN 50483-4.

Connector is fitted on a main conductor and a tap conductor. Assembly is installed in enclosure with regulated temperature -25°C / +70°C at a test temperature of -10°C.

After one hour, assembly is maintained in enclosure, connector screw is tightened until shear head breaks, performing tightening of one quarter turn for approximately 2 seconds, tightening being spaced out by 2 seconds. Breaking torque value is recorded.

Test is performed again with a test temperature of +50°C.

Breaking torque values should be comprised between margins given by manufacturer, i.e. between 13,5 N.m and 16,5 N.m.

TEST RESULTS

CONNECTORS TYPE	SAMPLE N°	CONDUCTORS SECTION (in mm²)		TEST TEMPERATURE	BREAKING TORQUE OF SHEAR HEAD (in N.m)	COMMENTS
		MAIN	TAP			
CBS/CT 95	17	16	2,5	-10°C	15,9	Satisfactory
	18	16	2,5		15,5	Satisfactory
	19	16	2,5		16,0	Satisfactory
	20	95	35		15,2	Satisfactory
	21	95	35		15,5	Satisfactory
	22	95	35		16,0	Satisfactory
	23	16	2,5	+50°C	15,3	Satisfactory
	24	16	2,5		14,8	Satisfactory
	25	16	2,5		15,7	Satisfactory
	26	95	35		15,2	Satisfactory
	27	95	35		15,0	Satisfactory
	28	95	35		15,2	Satisfactory

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ВАРНО С ОПРЕДЕЛЕНИЕТО



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TEST DESCRIPTION : 8.1.2.5 Low voltage impact test

Page 1/1

DATE : ON 27/10/2011

PLACE : MICHAUD SA Test Laboratory

OPERATOR : JP. ROPY

N° OF SAMPLES : 29 up to 32

TEST EQUIPMENTS :

- Dynamometric equipment GRIN 15N.m and 70N.m
- Protection degree against mechanical impacts
- Enclosure with regulated temperature -25°C / +70°C

PROCEDURES

Procedures and acceptance criteria are the ones of § 8.1.2.5 of Standard NF EN 50483-4.

Connector is fitted on a main conductor and a tap conductor, screw being tightened until shear head breaks.

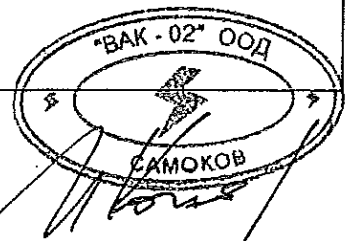
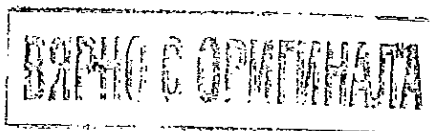
Assembly is installed in enclosure with regulated temperature -25°C / +70°C at a test temperature of -10°C.

After one hour, assembly being maintained in enclosure, 2 mechanical impacts are applied by letting a 900g hammer fall over a 200mm height with the help of the figure 2 test device of Standard NF EN 50483-4. Mechanical impacts are located as follows : one on the top of the connector (on the unscrewing head), the other one on the side (on the face including the markings).

No deterioration, being in a position to damage the connector good working, should be observed.

TEST RESULTS

CONNECTORS TYPE	SAMPLE N°	CONDUCTORS SECTION (in mm ²)		BREAKING TORQUE OF SHEAR HEAD (in N.m)	TEST TEMPERATURE	COMMENTS AFTER 2 IMPACTS APPLICATION
		MAIN	TAP			
CBS/CT 95	29	95	2,5	15,0	-10°C	Satisfactory No damage
	30	95	2,5	15,6		Satisfactory No damage
	31	95	35	15,2		Satisfactory No damage
	32	95	35	15,1		Satisfactory No damage



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MICHAUD SA TEST LABORATORY	TEST REPORT QUALIFICATION TESTS OF CBS/CT 35 (K222) N° 130-11-34-04	Date : 06/01/2012 Page : 10/22
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TEST DESCRIPTION : 8.1.3.1.3.2. Test in air	Page 1/1
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DATE : ON 21/09/2011 AND 07/11/2011 PLACE : MICHAUD SA Test Laboratory	OPERATOR : JP. ROPY
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N° OF SAMPLES : 41 up to 44

TEST EQUIPMENTS : Dynamometric equipment GRIN 15N.m and 70N.m Degrees of protection provided by enclosures (code IP) Dielectric test equipment A1105
--

PROCEDURES

Procedures and acceptance criteria are the ones of § 8.1.3.1.3.2 of Standard NF EN 50483-4, connectors being considered to be of class 2.

If test is performed before climatic ageing one, connector is tightened on main conductor and tap conductor up to minimal torque, i.e. 13,5 N.m.

Stripped ends of conductors are equipped with a sealing cap. Then, assemblies connector - conductors are installed horizontally, are covered with metal grid of meshes smaller than 5mm. Before test and during strength application, assemblies are exposed to an artificial rain defined according to IPX3 protection degree of standard NF EN 60529 : water drizzles in a direction making an angle lower or equal to 60° on both sides of the vertical.

Voltage generator used is regulated to release under a 10mA leaking current.

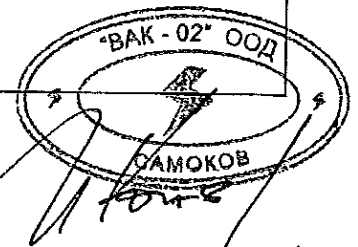
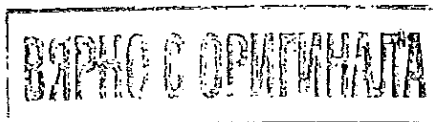
During exposure to artificial rain, a dielectric test is performed on assembly under a voltage at industrial frequency for one minute. Voltage increase is performed at a 1kV/s speed.
 Test is performed at 4kV before and after 8.1.5.2 climatic ageing test.

No breakage or flashover (release of voltage source) should occur.

TEST RESULTS

CONNECTORS TYPE	SAMPLE N°	PREVIOUS TEST	CONDUCTORS SECTION (in mm ²)		TEST VOLTAGE	COMMENTS AFTER 1 MIN OF VOLTAGE APPLICATION	FOLLOWING TEST
			MAIN	TAP			
CBS/CT 95	41	/	95	2,5	4 kV	Satisfactory	8.1.5.2
		8.1.5.2			4 kV	Satisfactory	/
	42	/	95	2,5	4 kV	Satisfactory	8.1.5.2
		8.1.5.2			4 kV	Satisfactory	/
	43	/	16	2,5	4 kV	Satisfactory	8.1.5.2
		8.1.5.2			4 kV	Satisfactory	/
	44	/	16	2,5	4 kV	Satisfactory	8.1.5.2
		8.1.5.2			4 kV	Satisfactory	/

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TEST DESCRIPTION: 8.1.4 Low temperature assembly test

Page 1/1

DATE: ON 31/10/2011

PLACE: MICHAUD SA Test Laboratory

OPERATOR: JP. ROPY

N° OF SAMPLES: 33 up to 38

TEST EQUIPMENTS:

- Enclosure with regulated temperature -25°C / +70°C
- Dynamometric equipment GRIN 15N.m and 70N.m
- Clamp multimeter MX1140

PROCEDURES

Procedures and acceptance criteria are the ones of § 8.1.4 of Standard NF EN 50483-4.

Each connector is fitted on main conductor and tap conductor. Assembly is installed in enclosure with regulated temperature -25°C / +70°C, at a temperature of -10°C.

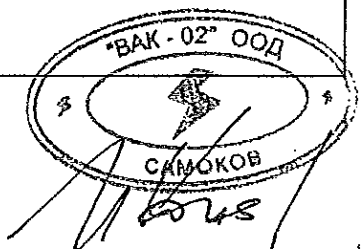
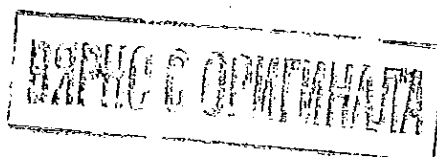
After one hour, assembly being maintained in enclosure, clamp multimeter MX1140 is connected to assembly, in order to check that current flows between main conductor and tap conductor.

Then, connector screw is tightened, until contact is established between conductors. Tightening torque value is recorded.

Contact establishment torque should be lower or equal to 0,7 times the minimal torque, i.e. 9,4 N.m.

TEST RESULTS

CONNECTORS TYPE	SAMPLE N°	CONDUCTORS SECTION (in mm ²)		TIGHTENING TORQUE VALUE WHEN ELECTRIC CONTACT IS ESTABLISHED (in N.m)	COMMENTS
		MAIN	TAP		
CBS/CT 95	33	95	35	6,8	Satisfactory
	34	95	35	6,5	Satisfactory
	35	16	35	7,3	Satisfactory
	36	16	35	5,7	Satisfactory
	37	95	2,5	5,2	Satisfactory
	38	95	2,5	6,0	Satisfactory



<u>TEST DESCRIPTION</u> : 8.1.5.1. Corrosion tests	Page 1/1
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<u>DATE</u> : FROM 05/10/2011 UP TO 14/12/2011 <u>PLACE</u> : MICHAUD SA Test Laboratory	<u>OPERATOR</u> : JP. ROPY
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N° OF SAMPLES : 39 and 40

TEST EQUIPMENTS :

- Dynamometric equipment GRIN 15N.m and 70N.m
- Corrosion enclosure

PROCEDURES

Procedures and acceptance criteria are the ones of § 8.1.5.1 (Test in gas atmosphere – Method 1) of standard NF EN 50483-4.

Connector is tightened on main conductor and tap conductor up to minimal torque, i.e. 13,5N.m. Then, a corrosion test is performed on assembly connector - conductor according to procedures of § 8.4.1 and § 8.4.2.1 of Standard NF EN 50483-6.

4 cycles of 14 days are considered, each cycle being composed of :

- * 7 days under salt spray test (NaCl concentration : 5% mass),
- * 7 cycles of 24h including 8h under saturated humidity atmosphere and high in sulphur dioxide (SO₂ concentration : 667p.p.m volume), and 16h at Laboratory atmosphere with test enclosure door opened.

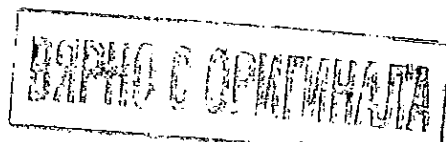
No cleaning is performed between both sequences.

At the end of corrosion test :

- * Neither significant trace of red rust, nor deterioration being in a position to damage the connectors good working, should be observed.
- * Marking enabling connectors identification shall be legible when examined with normal or correction vision without magnification.
- * Connectors should be in a position to be loosened at a torque lower or equal to maximal torque, i.e. 16,5N.m.

TEST RESULTS

CONNECTORS TYPE	SAMPLE N°	CONDUCTORS SECTION (in mm ²)		COMMENTS AFTER 4 CYCLES OF 14 DAYS	LOOSENING TORQUE (in N.m)	COMMENTS
		MAIN	TAP			
CBS/CT 95	39	16	2,5	- Metallic parts slightly oxidised on the surface, but no significant trace of red rust - No visible damage - Legible connector marking	11,9	Satisfactory
	40	16	2,5	- Metallic parts slightly oxidised on the surface, but no significant trace of red rust - No visible damage - Legible connector marking	12,5	Satisfactory



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TEST DESCRIPTION : 8.1.5.2 Climatic ageing test Page 1/1

DATE : FROM 23/09/2011 UP TO 04/11/2011 OPERATOR : JP. ROPY
PLACE : MICHAUD SA Test Laboratory

N° OF SAMPLES : 41 up to 44

TEST EQUIPMENT
 - Climatic ageing enclosure XR 35

PROCEDURES

Procedures and acceptance criteria are the ones of § 8.1.5.2 (Method 1) of Standard NF EN 50483-4.

Sample being fitted as indicated in test 8.1.3.1.3.1, a climatic ageing test is performed on assembly according to procedures of § 8.5.1 of Standard NF EN 50483-6.

Harshness of test is the following one :

- * 6 normalised weekly cycles according to figure 2 of Standard NF EN 50483-6,
- * Enclosure temperature of periods A and C : 70 °C,
- * Energize light of periods A, B and C : 4,3mW/cm² between 300nm and 400nm.

At the end of the climatic ageing cycles, samples are kept between 24 and 72 hours at room temperature of Laboratory.

Then, following tests are performed :

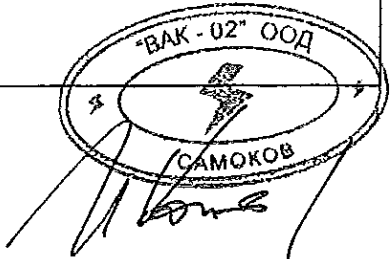
- * No deterioration of organic parts, being in a position to damage the connectors good working, should be observed.
- * Marking enabling connectors identification shall be legible when examined with normal or correction vision without magnification.
- * Connectors should comply with dielectric strength test in air : refer to test 8.1.3.1.3.2 of the present test report.

TEST RESULTS

CONNECTORS TYPE	SAMPLE N°	PREVIOUS TEST	COMMENTS AFTER 6 WEEKS OF CLIMATIC AGEING	FOLLOWING TEST
CBS/CT 95	41	8.1.3.1.3.2	- Material of connector body is lightly whitened on the exposed side, but no visible damage is observed - Connector markings remain legible	8.1.3.1.3.2
	42	8.1.3.1.3.2	- Material of connector body is lightly whitened on the exposed side, but no visible damage is observed - Connector markings remain legible	8.1.3.1.3.2
	43	8.1.3.1.3.2	- Material of connector body is lightly whitened on the exposed side, but no visible damage is observed - Connector markings remain legible	8.1.3.1.3.2
	44	8.1.3.1.3.2	- Material of connector body is lightly whitened on the exposed side, but no visible damage is observed - Connector markings remain legible	8.1.3.1.3.2

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ВАРНИК С ОПИТИВАНАТА



TEST DESCRIPTION : 8.1.6 Electric ageing test Page 1/8

DATE : FROM 13/09/2011 UP TO 13/11/2011
PLACE : MICHAUD SA Test Laboratory **OPERATOR :** JP. ROPY

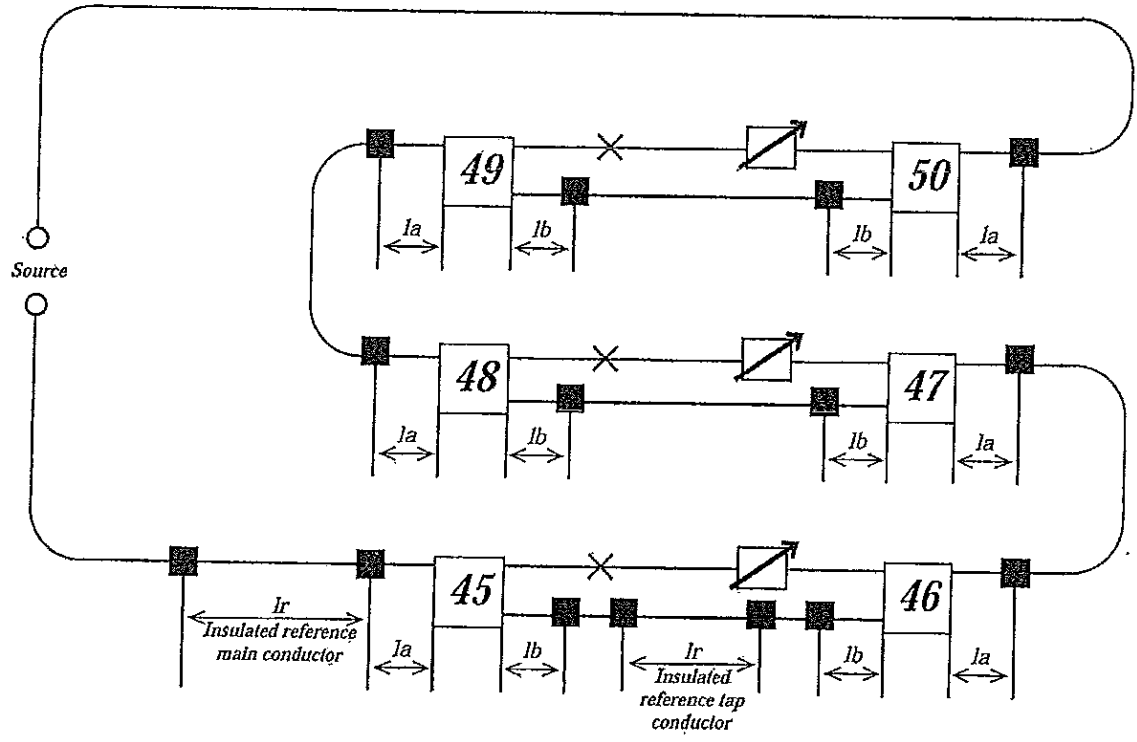
N° OF SAMPLES : 45 up to 50

TEST EQUIPMENTS :
 - Electric ageing bench n°5
 - Measure station NI2
 - Dynamometric equipment GRIN 15N.m and 70N.m

PROCEDURES

Procedures and acceptance criteria are the ones of § 8.1.6 of Standard NF EN 50483-4 which refers to Standard NF EN 50483-5. Connectors are considered to be of class B.

The test loop performed according to Standard NF EN 50483-5 corresponds to figure 6 :



LEGEND

Connector	Aluminium 95mm main conductor
Voltage measure point (equalizer)	Aluminium 35mm² tap conductor
Impedance corrector	Contactor

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ВАРНИК С ОРГАНИЗАЦИЈА

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САМОКОВ

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TEST DESCRIPTION : 8.1.6 Electric ageing test

Page 2/8

1. Preparation of the loop

* Loop parameters are calculated :

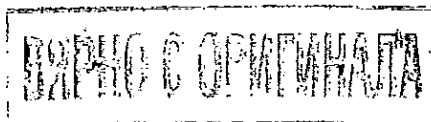
la	lb	lr
200 mm	150 mm	350 mm

- * Voltage measures are performed by means of equalizers (welding method : "TIG", metal filler : aluminium for cable aluminium conductors). They are installed as shown on the previous schemas.
- * Conductors coming out of the connectors, as well as the reference conductor are equipped with lugs, in order to be connected to electric ageing bench.

2. Assembly of the loop

- Conductors are inserted in connector.
- Screw is tightened up to minimal torque, i.e. 13,5 N.m.
- Conductors equipped with lugs are linked between each other, and to electric ageing bench.
- Voltage measures points are fitted,
- Temperature measures are fitted as follows :

	TYPE OF THERMOCOUPLE	PLACE OF FIXING	TYPE OF HOLD
Connector	- type "k", "sheathed" in a tube of Inconel, - diameter 1mm.	- at the lower part of the contact bridge in a 1,2mm diameter hole.	- covered with "thermo-conductor" grease - holding with a mastic type "polyurethane"
Reference conductor	- type "k", "sheathed" in a tube of Inconel, - diameter 1mm.	- in the "middle" of the reference conductor core.	- holding through a splice (copper wire of diameter 0,4mm) - covered with "thermo-conductor" grease
Room temperature	- type "k", "sheathed" in a tube of Inconel, - diameter 1mm.	- at the center of the loop in the horizontal level containing connectors	/



TEST DESCRIPTION : 8.1.6 Electric ageing test

Page 3/8

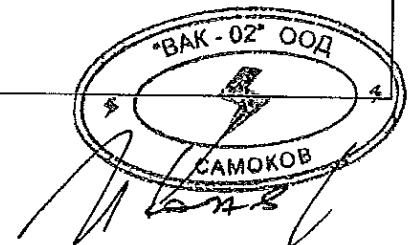
3. Process of a cycle

Heating at 97,5°C of 35 mm² Alu reference conductor	Duration	12 min
	Intensity in tap	~ 250A
	Intensity in main	~ 410A
Step at 97,5°C of 35 mm² Alu reference conductor	Duration	45 min
	Intensity in tap	~ 200A
	Intensity in main	~ 350A
Temperature measure every 50 cycles up to the 250 th cycle, then every 75 cycles		
Cooling	Duration	30 min
Resistance measure every 50 cycles up to the 250 th cycle, then every 75 cycles		
Total duration of a cycle	Duration	87 min

4. Performing of the test - Measures

- Resistance measure is performed under a direct current of 10A, when new and every 50 cycles up to the 250th cycle, then every 75 cycles at the end of cooling period.
- Resistance values are put down at 20°C before using and real resistances of connectors (Rj) are calculated according to § 5.6.2 of Standard NF EN 50483-5.
- Test is composed of 1 000 electric ageing cycles.

ДИРЕКЦИЈА ЗА ОПИТИВАЊАТА



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TEST DESCRIPTION : 8.1.6 Electric ageing test

Page 4/8

TEST RESULTS

TEMPERATURES RECORD
(in °C)

Cycles	Reference conductor		Connectors						Room temperature
	Tap 35 mm ² Alu	Main 95 mm ² Alu	45	46	47	48	49	50	
1	97,0	98,0	72,5	66,4	69,3	67,2	71,8	67,1	23,8
50	96,0	100,5	74,9	67,4	71,4	69,9	76,8	71,1	25,4
100	97,9	99,7	77,2	70,1	72,7	71,9	77,1	72,6	24,0
150	96,9	100,5	77,8	68,0	71,0	69,7	75,7	71,1	23,0
200	98,3	99,6	78,9	70,1	72,1	71,7	78,4	73,1	24,5
250	97,6	100,5	75,5	68,6	71,0	70,7	76,9	72,5	24,8
325	97,4	101,7	75,0	66,3	70,7	69,5	76,5	70,8	25,8
400	96,5	98,1	76,4	69,8	71,3	72,8	77,8	73,2	25,7
475	97,4	100,2	78,6	69,8	72,6	71,9	77,9	73,0	23,3
550	98,2	99,7	76,2	70,6	72,1	73,0	77,8	72,4	24,6
625	97,6	98,7	76,0	70,5	71,8	73,3	78,0	73,5	25,8
700	97,6	99,6	76,4	67,3	69,8	69,4	75,5	70,1	24,4
775	96,3	97,5	77,5	68,3	70,0	70,1	76,3	71,2	22,6
850	97,6	98,8	75,6	70,9	72,0	72,8	77,8	73,4	23,4
925	97,9	101,3	75,2	71,0	71,7	73,1	78,3	73,3	24,5
1000	97,0	100,7	79,3	70,9	72,8	73,6	79,2	73,9	25,5



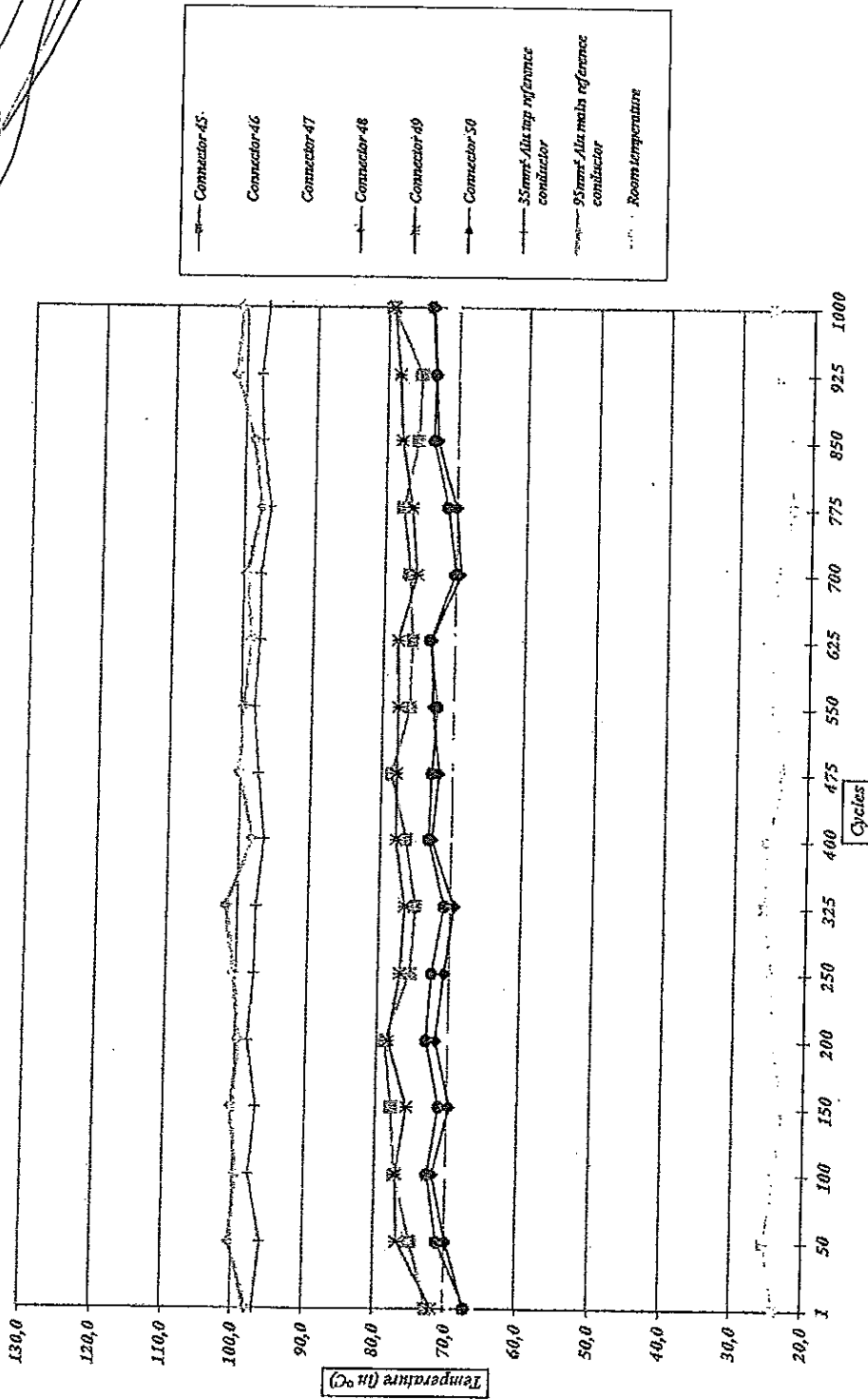
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TEST DESCRIPTION : 8.1.6 Electric ageing test

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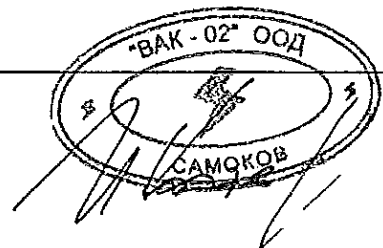
TEST DESCRIPTION : 8.1.6. Electric ageing test

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Rj RESISTANCES RECORD
(in $\mu\Omega$)

Cycles	Connectors					
	45	46	47	48	49	50
0	72,5	84,0	79,4	83,3	93,7	78,7
50	82,2	101,3	90,6	94,2	105,8	91,8
100	84,0	104,3	94,0	96,6	110,5	94,6
150	85,2	106,6	95,5	97,7	112,7	95,5
200	85,9	108,6	96,7	98,6	114,0	96,5
250	86,5	109,6	97,4	99,2	115,0	97,1
325	86,8	110,5	98,2	99,7	115,9	97,5
400	87,4	111,3	99,0	100,2	116,9	98,0
475	87,7	112,3	99,9	100,8	118,0	98,5
550	88,3	113,1	100,7	101,3	118,9	98,9
625	88,6	114,1	101,5	101,9	120,0	99,4
700	89,2	115,0	102,3	102,5	121,1	99,9
775	89,6	115,8	103,2	102,9	122,1	100,4
850	90,0	116,7	104,0	103,4	123,1	101,0
925	90,3	117,6	104,8	104,0	124,1	101,4
1000	91,3	118,8	105,4	104,7	125,1	101,9

ВЪРНО С ОРГАНИЗАЦИЯТА

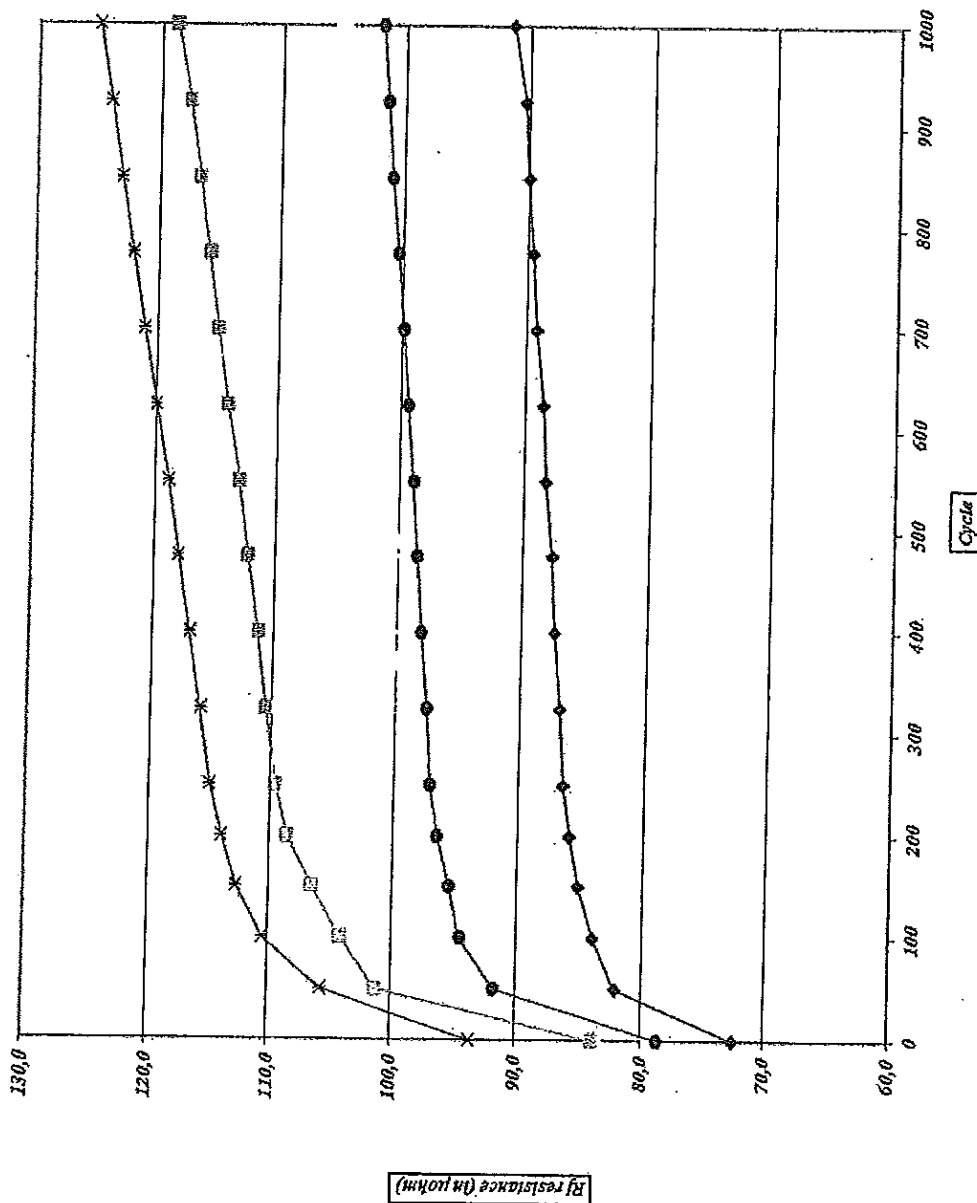
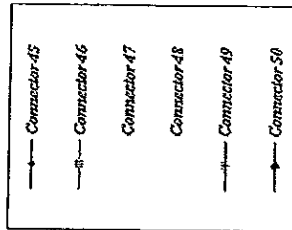


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TEST DESCRIPTION : 8.1.6, Electric ageing test

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ВАЖНО С ОБИТНАТА

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TEST DESCRIPTION : 8.1.6 Electric ageing test

Page 8/8

Results obtained are the ones expected in § 5.6.4 of Standard NF EN 50483-5 which defines following acceptance criteria :

- ◇ Initial scatter of resistances : $\delta \leq 0,30$
- ◇ Average scatter of resistances : $\beta \leq 0,30$
- ◇ Stability of R_j resistances (on the 11 last measures) : $\frac{\Delta R_j}{R_j} \leq 15\%$
- ◇ Resistance report : $\lambda \leq 2,0$
- ◇ Stability of θ_j temperatures (on the 11 last measures) :
 - * $\bar{d}_j - 10 \leq d_j \leq \bar{d}_j + 10$ with : * $d_j = \theta_R - \theta_j$
 - * θ_R : temperature of the warmest reference conductor
 - * $\theta_j \leq \text{Max } \theta_R$

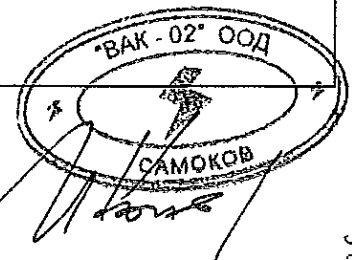
1) Temperature

CONNECTORS TYPE	SAMPLE N°	TEMPERATURE MAXI θ_j	STABILITY OF TEMPERATURES (in K)			
			$\bar{d}_j - 10$	Min d_j	Max d_j	$\bar{d}_j + 10$
CBS/CT 95	45	79,3	10,9	17,7	22,7	30,9
	46	71,0	17,9	26,1	31,3	37,9
	47	72,8	15,9	24,2	27,8	35,9
	48	73,6	15,5	23,4	28,2	35,5
	49	79,2	9,9	17,8	22,1	29,9
	50	73,9	14,9	23,1	27,5	34,9

2) Resistance

CONNECTORS TYPE	SAMPLE N°	INITIAL SCATTER δ	AVERAGE SCATTER β	STABILITY OF RESISTANCES (in %)	$\frac{\Delta R_j}{R_j}$	RESISTANCE REPORT λ
CBS/CT 95	45	0,143	0,177	5,4		1,259
	46			8,1		1,414
	47			7,9		1,327
	48			5,4		1,257
	49			8,4		1,335
	50			4,8		1,295

ВЪРНЕ С ОРДИНАЛАТА



<u>TEST DESCRIPTION</u> : 9.2 Test for permanent marking	Page 1/1
--	----------

<u>DATE</u> : ON 12/09/2011 <u>PLACE</u> : MICHAUD SA Test Laboratory	<u>OPERATOR</u> : JP. ROPY
--	----------------------------

N° OF SAMPLES : 45 up to 50

TEST EQUIPMENT :
- Indellibility of markings

PROCEDURES

Procedures and acceptance criteria are the ones of § 9.2 of Standard NF EN 50483-1.

Markings are hand-rubbed with a rag soaked with water for 15 s, then with a rag soaked with hexane for 15 s.

At the end of test, markings should enable connector identification.

TEST RESULTS

CONNECTORS TYPE	SAMPLE N°	PREVIOUS TEST	COMMENTS	FOLLOWING TEST
CBS/CT 95	45	/	Satisfactory - Legible markings	8.1.6
	46	/	Satisfactory - Legible markings	8.1.6
	47	/	Satisfactory - Legible markings	8.1.6
	48	/	Satisfactory - Legible markings	8.1.6
	49	/	Satisfactory - Legible markings	8.1.6
	50	/	Satisfactory - Legible markings	8.1.6

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ВЪРНО С ОРГАНИЗАТА

"BAK - 02" ООД
САМОКОВ

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СПИСЪК НА ОТДЕЛНИТЕ ИЗПИТВАНИЯ ЗА КЛЕМА СГРАДНО
ОТКЛОНЕНИЕ - К 222

№ на тест: 130-11-34-04

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MICHAUD

BP 11 - Z.I. LE BLANCHON - 01160 PONT D'AIN - (FRANCE)

MATERIEL ELECTRIQUE

LABORATOIRE D'ESSAIS
TEST LABORATORY

RAPPORT D'ESSAIS TEST REPORT

ESSAIS DE QUALIFICATION INTERNE
DU CES/CTEC 95 (L227)
N° 130-10-14-01

INTERNAL QUALIFICATION TEST
OF CES/CTEC 95 (L227)
N° 130-10-14-01

02/09/2010

DEMANDEUR : Bureau d'Etudes MICHAUD SA
REQUESTED BY : MICHAUD SA's Research Department

PRESENTATION : Ce document regroupe les essais de qualification interne du connecteur CES/CTEC95 (L227). Les matériels testés sont de fabrication MICHAUD SA.

INTRODUCTION : Les modalités d'essais retenues sont celles de la norme NF C 33-020 de Juin 1998.
This document gathers the internal qualification tests of connector CES/CTEC 95 (L227). Tested products are of MICHAUD's manufacture.
The test procedures are the ones of the standard NF C 33-020 dated June 1998.

На основание чл. 2
от ЗЗЛД

DIFFUSION : Le 02/09/2010 - 1 exemplaire original UR (LE)
Le 17/03/2011 - 1 exemplaire original LOBUT-AK (Bulgarie)
- 1 exemplaire original COM (Classement Client)

ISSUANCE : On the 02/09/2005 - 1 original to UR (LE)
On the 17/03/2011 - 1 original to LOBUT-AK (Bulgarie)
- 1 original to COM (Customer filing)

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Any copy of this test report is authorized only as its complete content after written authorization from the test laboratory of MICHAUD SA. The test report hereafter concerns only the samples tested.

Seule la version française fait foi. The French version is legally acceptable.

Ce document comporte 20 pages (y compris la présente page 1).
This document includes 20 pages (including this page 1).

S.A. au capital de 2 148 000 € - R.C. Bourg 76B 208 - SIRET 314 634 338 00037 / 312 A - C.C.P. LYON 6LS1-48 M - Doin Société Générale, Bourg-en-Bresse

ВАРЖО С ОПРИМЕНАТА



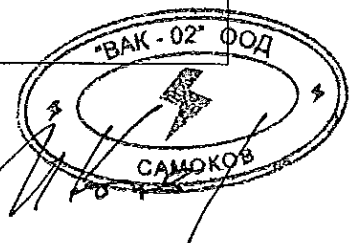
СЕРТИФИКАТ

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(*) The numbers of paragraph are given in the standard NF C 33-020 dated June 1998.

ВЯРНО С ОРИГИНАЛАТА



I) INTRODUCTION

1. Subject

This document gathers the internal qualification tests of connector CES/CTEC 95 (L 227) . Tested products are of MICHAUD's manufacture.

Test procedures are the ones of the standard NF C 33-020 dated June 1998.

For each test, there is a test sheet grouping procedures and results.

1.2 Tested products

Tested products are street lightning single pole connectors CES/CT 95 for aerial conductors, according to the technical file «CES EXP». These products are coming from an industrial pilot series and have been delivered to Test Laboratory on 13/05/2010.

DESIGNATION	REFERENCE	N° OF BATCH
CES/CTEC 95 G2	L227	05-19-00

1.3 Order of tests

Samples are numbered from 1 to 26.

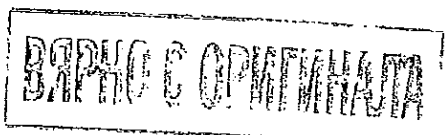
NUMBER OF SAMPLES	TESTS
1 to 4	2.3.1 Control of the electric continuity, torque limiters and mechanical strength of the connector
5 to 8	2.3.2 Influence of the tightening on the mechanical strength of the main conductor
9 and 10	2.3.3 Control of the mechanical strength of the tap conductors
11 to 14	2.4 Dielectric test 2.6 Climatic ageing test
15 to 18	2.5 Low temperature assembly test
19 and 20	2.7 Corrosion resistance test
21 to 26	2.8 Electric ageing test

Remark : The tests numbers are the ones corresponding to the standard NF C 33-020 dated June 1998.

II) STANDARD DOCUMENTS REFERRED TO IN THIS REPORT

- French standards

- C 20-540 : June 2002,
«Environmental testing - Test methods - Climatic ageing test of equipment and synthetic materials for outdoor use».
- NF C 32-201-3 : October 1998 + Additive 1 of November 2000,
«Polyvinyl chloride insulated cables of rated voltages up to and including 450/750V - Part 3 : Non-sheathed cables for fixed wiring».
- C 33-003 : July 1996,
«Equipment of overhead distributions made of bare or insulated conductors».



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- NF C 33-004 : June 1998,
«Insulated cables and their accessories for power systems - Connecting equipment for overhead distributions and services of rated voltage 0,6/1kV with at least one insulated core - Electrical ageing tests».
- NF C 33-020 : June 1998,
«Insulated cables and their accessories for power systems - Insulation piercing branch - connectors for overhead distributions and services with bundle assembled cores of rated voltage 0,6/1kV».
- NF C 33-209 : July 1996,
«Insulated or protected cables for power systems - Bundle assembled cores for overhead systems of rated voltage 0,6/1kV».

III) GENERAL CONDITIONS

• Temperature

Tests are carried out at the room temperature of the test laboratory between 20°C and 26°C.

• Conductors used

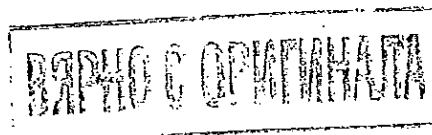
STANDARD	NAME OF MANUFACTURER	NOMINAL CROSS-SECTIONAL AREA (In mm ²)	NUMBER OF STRANDS AND COMPOSITION OF CORE	Ø OVER INSULANT (In mm)	Ø OVER CORE (In mm)
NF C 33-209	Câblerie de Lens	95	19 strands aluminium	15,0	11,2
	NEXANS	16	7 strands aluminium	7,2	4,7
NF C 32-201-3	NEXANS	6	7 strands copper	4,7	3,9
	NEXANS	1,5	massive copper	3,4	1,3

Before tests, conductors are conditioned, according to § 2.2.2 of the standard NF C 33-020, as follows : they are put in an enclosure during 1 h at 120°C, then the door of enclosure is opened so that conductors come back to room temperature.

Remark : Overhead aluminium 10mm² conductor being not in common usage, tests are carried out on an aluminium 16mm² conductor (main minimal section).

IV) TESTS

On the following pages, sheets of each performed test can be found.



TEST DESCRIPTION : 2.3.1 Control of the electric continuity, torque limiters and mechanical strength of the connector Page 1/1

DATE : 23/05/2010 **PLACE :** MICHAUD test laboratory **OPERATOR :** JP. ROPY

N° OF SAMPLES : 1 to 4

TEST EQUIPMENTS :

- Dynamometric equipment GRK 15N.m and 70N.m
- Tightening test machine
- Mechanical tensile strength and endurance bench
- Clamp multimeter MX1140

PROCEDURES

Procedures and acceptance criteria are the ones of § 2.3.1 of standard NF C 33-020.

Main conductor is strained. Tensile strength on the core is the following :

- 400 N for 16mm² conductor,
- 2 #00 N for 95mm² conductor.

Connector is fitted on a strained main conductor and a tap conductor. It is tightened up to 0,7 times the minimal torque (0,7 x 8,1 ≈ 5,6N.m) : contact must be established between the conductors (this is checked by means of the clamp multimeter MX1140).

Then, it is tightened until shear-head breaks, obtained value being recorded. It must be contained between the margins given by the manufacturer, between 8,1N.m and 9,9N.m.

Then, tightening is performed up to 1,5 times the maximal torque (1,5 x 9,9 ≈ 14,9N.m).

No breakage of the connector nor the conductor core should occur.

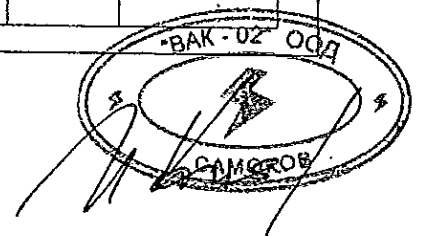
Finally, tightening is performed until a part of the connector breaks.

TEST RESULTS

N° OF SAMPLES	SECTION OF CONDUCTORS (in mm ²)		COMMENTS AFTER TIGHTENING AT 0,7 TIMES THE MINIMAL TORQUE (5,6 N.m)	SHEAR-HEAD BREAKAGE TORQUE (in N.m)	COMMENTS AFTER TIGHTENING AT 1,5 TIMES THE MAXIMAL TORQUE (14,9 N.m)	BREAKAGE	
	MAIN	TAP				VALUE (in N.m)	PLACE
1	16	6	Contact is established	9,2	Satisfactory	17,2	Upper body breakage
2	16	6	Contact is established	8,7	Satisfactory	16,5	Screw breakage
3	95	6	Contact is established	9,0	Satisfactory	15,9	Screw breakage
4	95	6	Contact is established	9,2	Satisfactory	16,6	Screw breakage

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ВАРНО С ОПРИТНАТА



TEST DESCRIPTION: 2.3.2 Influence of the tightening on the mechanical strength of the main conductor Page 1/1

DATE: 24/05/2010 **OPERATOR:** JP. RAPPY
PLACE: MICHAUD test laboratory

N° OF SAMPLES: 5 to 8

TEST EQUIPMENTS

- Dynamometric equipment GRIN 15N.m and 70N.m
- Mechanical tensile strength and endurance bench

PROCEDURES

Procedures and acceptance criteria are the ones of § 2.3.2 of standard NF C 33-020.

Main conductor is strained. Tensile strength on the core is the following :

- 240N for 16mm² conductor,
- 1 330N for 95mm² conductor.

Connector is tightened for about 15 seconds on this main conductor and on the tap conductor up to the maximal torque (18,0N.m).

Then an increasing tensile strength is applied on the main conductor core, with a progress between 1 000N/min and 5 000N/min up to the following values :

- 1 200N for 16mm² conductor,
- 6 650N for 95mm² conductor.

This strength is maintained during one minute.

No breakage of the conductor core should occur during the tensile strength application.

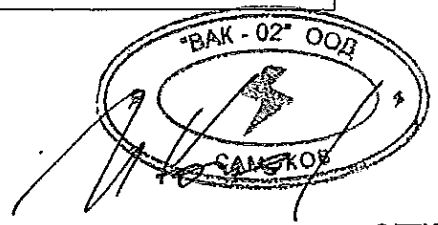
Then strength is increased until a part of the connector breaks.

TEST RESULTS

N° OF SAMPLES	SECTION OF CONDUCTORS (in mm ²)		STRENGTH APPLIED DURING 1 MIN (in N)	COMMENTS AFTER 1 MIN OF STRENGTH APPLICATION	BREAKAGE	
	MAIN	TAP			VALUE (in N)	PLACE
5	16	6	1 200	Satisfactory	1 420	Breakage of conductor at piercing teeth
6	16	6	1 200	Satisfactory	1 630	Breakage of conductor at piercing teeth
7	95	6	6 650	Satisfactory	8 700	Breakage of conductor at piercing teeth
8	95	6	6 650	Satisfactory	8 230	Breakage of conductor at piercing teeth

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ВЯРНО С ОПИТИНАТА



MICHAUD SA
TEST LABORATORY

TEST REPORT
INTERNAL QUALIFICATION TESTS OF CES/CTBC 95 (L 227) N° 130-10-14-01

Date : 02/09/2010
Page : 7/20

TEST DESCRIPTION : 2.3.3 Control of the mechanical strength of the tap conductors

Page 1/1

DATE : 24/05/2010

PLACE : MICHAUD test laboratory

OPERATOR : JP. ROPY

N° OF SAMPLES : 9 and 10

TEST EQUIPMENTS

- Dynamometric equipment GRIN 15N.m and 70N.m
- Mechanical tensile strength and endurance bench

PROCEDURES

Procedures and acceptance criteria are the ones of § 2.3.3 of standard NF C 33-020.

Connector is tightened for about 15 seconds on this main conductor and on the tap conductor up to the maximal torque (9,9N.m).

The assembly connector - conductor is installed between the clamping jaws of the tensile strength machine. An increasing tensile strength is applied on the tap conductor core, with a progress between 100N/min and 500N/min up to 70N.

The strength is maintained during one minute.

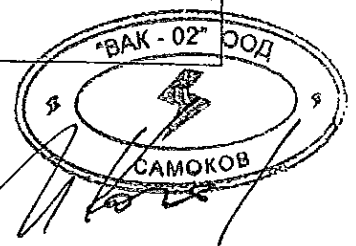
No breakage or sliding of the conductor core should occur during the time of strength application.

Then strength is increased until a part of the assembly connector - conductor breaks.

TEST RESULTS

N° OF SAMPLES	SECTION OF CONDUCTORS (in mm²)		COMMENTS AFTER 1 MIN OF STRENGTH APPLICATION (70N)	BREAKAGE	
	MAIN	TAP		VALUE (in N)	PLACE
9	16	1,5	Satisfactory	90	Breakage of conductor at piercing teeth
10	16	1,5	Satisfactory	100	Breakage of conductor at piercing teeth

ВЕРНО С ОПИТАНАТА



TEST DESCRIPTION: 2.4 Dielectric test

Page 1/1

DATE : 02/06/2010

PLACE : MICHAUD test laboratory

OPERATOR : JP. ROPY

N° OF SAMPLES : 11 to 14

TEST EQUIPMENTS

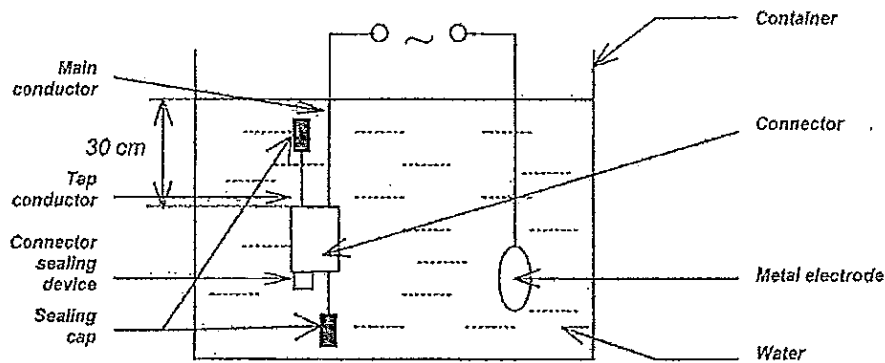
- Dynamometric equipment GRIN 15N.m and 70N.m
- Dielectric test equipment A1105

PROCEDURES

Procedures and acceptance criteria are the ones of § 2.4.1 et 2.4.2 of the standard NF C 33-020.

Each connector is tightened on the main and tap conductors, up to the minimal torque (8,1N.m).

After having put a sealing cap on the stripped extremities of the conductors, assemblies connector - conductors are installed vertically in water, as shown below :



Water temperature is 20°C.

Voltage generator used is regulated to release under a 10mA leaking current.

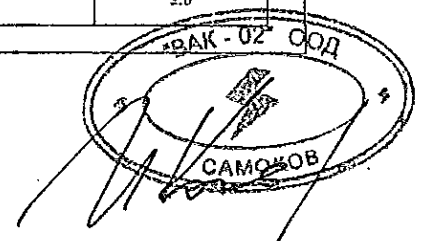
After 30 min under water, a dielectric test is performed on the assembly under a 6 kV voltage at an industrial frequency during one minute. The increase of voltage is performed at a 1 kV/s speed.

No breakage (release of voltage source) should occur.

TEST RESULTS

N° OF SAMPLES	SECTION OF CONDUCTORS (in mm²)		COMMENTS AFTER 1 MIN UNDER 6kV	FOLLOWING TEST
	MAIN	TAP		
11	16	1,5	Satisfactory	2.6
12	16	1,5	Satisfactory	2.6
13	95	1,5	Satisfactory	2.6
14	95	1,5	Satisfactory	2.6

ВАРНО С ОБИТНАТА



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<u>TEST DESCRIPTION</u> : 2.5 Low temperature assembly test	Page 1/1
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<u>DATE</u> : 31/05/2010 <u>PLACE</u> : MICHAUD test laboratory	<u>OPERATOR</u> : JP. ROPY
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<u>N° OF SAMPLES</u> : 15 to 18

<u>TEST EQUIPMENTS</u> - Enclosure with regulated temperature - 25°C + 45°C - Dynamometric equipment GRIN 15N.m and 70N.m - Clamp multimeter MX1140
--

PROCEDURES

Procedures and acceptance criteria are the ones of § 2.5 of standard NF C 33-020.

Each connector is fitted on the main and tap conductors. The assembly is installed in the enclosure at regulated temperature - 25°C + 45°C, at a temperature of - 11°C.

After one hour, the assembly being kept in the enclosure, the clamp multimeter MX1140 is connected to the assembly, in order to check that current flows.

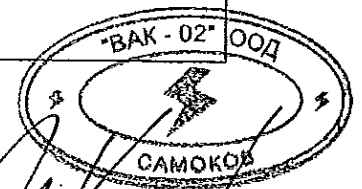
Screw of the connector is tightened, until contact is established between the conductors. Value of tightening torque is recorded.

Torque when contact is established must be less or equal to 0,7 times the minimal torque : 5,6N.m.

TEST RESULTS

N° OF SAMPLES	SECTION OF CONDUCTORS (in mm ²)		TIGHTENING TORQUE VALUE WHEN THE ELECTRICAL CONTACT IS ESTABLISHED (in N.m)	REMARKS
	MAIN	TAP		
15	16	6	2,7	Satisfactory
16	16	6	2,3	Satisfactory
17	95	6	3,0	Satisfactory
18	95	6	2,5	Satisfactory

ВЯРНО С ОФИЦИАЛАТА



ms

TEST DESCRIPTION : 2.6 Climatic ageing test

Page 1/3

DATE : 03/06/2010 TO 15/07/2010
PLACE : MICHAUD test laboratory

OPERATOR : JP. RAPPY

N° OF SAMPLES : 11 to 14

TEST EQUIPMENTS

- Climatic ageing enclosure XR 35
- Dielectric test equipment A1105

PROCEDURES

Procedures and acceptance criteria are the ones of § 2.6 of standard NF C 33-020.

CLIMATIC TEST

Sample is set up as indicated in test 2.4, the assembly is subjected to a climatic ageing test according to procedures of standard C 20-540.

Samples support 6 weekly cycles, enclosure temperature is 70 (\pm 2) °C for the conditionings A and C.

ACCEPTANCE CRITERIA

After test, samples are kept between 24 hours and 72 hours at the room temperature of the laboratory.

Then they are tested accordingly :

➤ Dielectric strength test in the balls

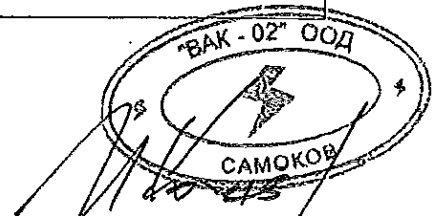
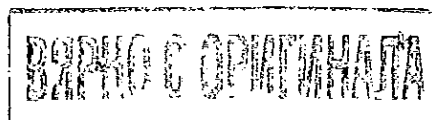
- ◊ Release point of the dielectric equipment is regulated at 10mA.
- ◊ Samples, placed horizontally, are covered with lead balls, diameter between 1,3 and 1,7mm, over about 2cm.
- ◊ Just after, a dielectric strength test is performed on the samples at a 6kV voltage at an industrial frequency during 1 min. Increase of voltage is performed at a 1kV/s speed.
- ◊ At the end of the test, no breakage should occur.

➤ Dielectric strength test in water

- ◊ As soon as the sample has been kept out of the balls, it is put under water as indicated at § 2.4 of this test report.
- ◊ After 30min under water, a dielectric strength is performed on the assembly under a 1kV voltage at an industrial frequency during 1 min.
- ◊ After this test, no breakage should occur.
- ◊ In order to know the breakage voltage level of the samples, a progressive increase of voltage is performed at a speed of about 1kV/s until breakage occurs. Value and place are recorded.

➤ Visual control

- ◊ At the end of the tests, marking of the pieces shall be legible when examined with normal or correction vision without magnification.



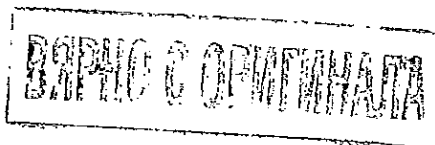
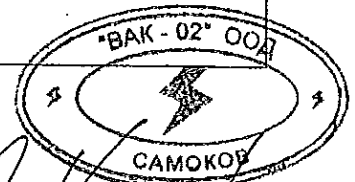
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TEST DESCRIPTION: 2.6 Climatic ageing test

Page 2/2

TEST RESULTS

N° OF SAMPLES	PREVIOUS TEST	COMMENTS AFTER CLIMATIC TEST	COMMENTS AFTER 1 MIN UNDER 6kV IN THE BALLS	COMMENTS AFTER 30 MIN AND 1kV UNDER WATER	BREAKAGE	
					VALUE (in kV)	PLACE
11	2.4	- Material of the connector body has slightly whitened on the exposed side - Material of the sealing device of the connector is not faded	Satisfactory	Satisfactory	2.1	Insulation piercing on top side
12	2.4	- Material of the connector body has slightly whitened on the exposed side - Material of the sealing device of the connector is not faded	Satisfactory	Satisfactory	2.3	Insulation piercing on top side
13	2.4	- Material of the connector body has slightly whitened on the exposed side - Material of the sealing device of the connector is not faded	Satisfactory	Satisfactory	2.5	Insulation piercing on top side
14	2.4	- Material of the connector body has slightly whitened on the exposed side - Material of the sealing device of the connector is not faded	Satisfactory	Satisfactory	1.9	Insulation piercing on main side



ms

M. Kous

MICHAUD SA
TEST LABORATORY

TEST REPORT
INTERNAL QUALIFICATION TESTS OF CES/CTEC 95 (L 227) N° 130-10-14-01

Date : 02/09/2010
Page : 12/20

TEST DESCRIPTION : 2.7 Corrosion resistance test

Page 1/1

DATE : 24/05/2010 TO 25/07/2010
PLACE : MICHAUD test laboratory

OPERATOR : JP. RAPPY

NP OF SAMPLES : 19 and 20

TEST EQUIPMENTS

- Dynamometric equipment GRIN 15N.m and 70N.m
- Corrosion enclosure

PROCEDURES

Procedures and acceptance criteria are the ones of § 2.7 of standard NF C 33-020.

Connector is tightened on the main and tap conductors up to the minimal torque (8,1N.m).

Then corrosion test is performed on the assembly connector - conductor, according to procedures of standard C 33-003.

4 cycles of 14 days, each cycle as follows :

- 7 days under salt spray test,
- 7 days of 24 h with 8 h under saturated humidity atmosphere and high in sulfur dioxide (56 h) and 16 h with the enclosure door opened at the laboratory atmosphere (112 h).

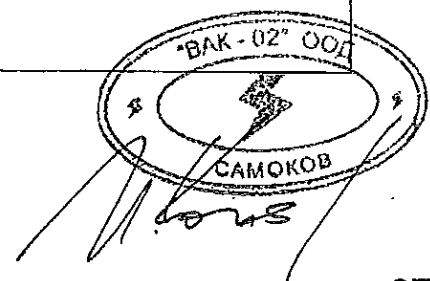
No cleaning is performed between the 2 sequences.

After this corrosion test, we must be able to loosen the connectors at an inferior or equal to maximal load authorized by the standard NF C 33-020 (20N.m).

TEST RESULTS

N° OF SAMPLES	SECTION OF CONDUCTORS (in mm ²)		COMMENTS AFTER 4 CYCLES OF 14 DAYS	LOOSENING TORQUE (in N.m)	REMARKS
	MAIN	TAP			
19	16	1,5	<ul style="list-style-type: none">- Parts made of synthetic material have no corrosion marks- Metallic parts are slightly oxidized on the surface	12,9	Satisfactory
20	16	1,5	<ul style="list-style-type: none">- Parts made of synthetic material have no corrosion marks- Metallic parts are slightly oxidized on the surface	14,7	Satisfactory

ВРЪЗКИ С ОВЪНТОВАНАТА



TEST DESCRIPTION : 2.8 Electric ageing test Page 1/8

DATE : 11/07/2010 TO 23/07/2010
 PLACE : MICHAUD test laboratory OPERATOR : JP. RAPPY

N° OF SAMPLES : 21 to 26

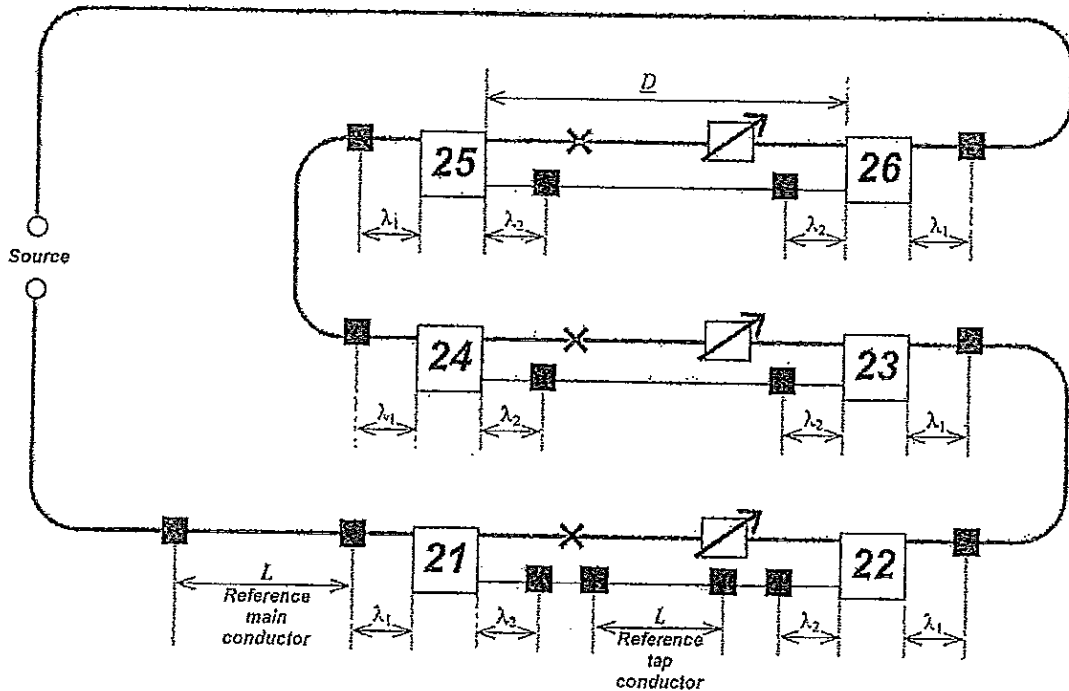
TEST EQUIPMENTS

- N° 1 electric ageing bench
- Measure station SA 70 N1
- Printer LQ 860 N2
- Dynamometric equipment GRD 15N.m and 70N.m

PROCEDURES

Procedures and acceptance criteria are the ones of § 2.8 of standard NF C 33-020 which refers to standard NF C 33-004 (connector of class B).

The test loop carried out according to standard NF C 33-004 is the loop "D" in "Z" form.



LEGEND

Connector	Aluminium 95mm ² main conductor
Voltage measure point (equalizer)	Copper 6mm ² tap conductor
Impedance corrector	Contactor

ВАРНО С ОПИТИВАТА

"BAK-02" ФОД
САМОКОВ

TEST DESCRIPTION: 2.8 Electric ageing test	Page 2/8
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1. Preparation of the loop

- Parameters of the loop are calculated :

λ_1	λ_2	L
200mm	150mm	350mm

- Voltage measures are performed by means of equalizers (welding method : «TIG», metal filler : aluminium 1 050A for aluminium cables, copper tinned wire for copper conductors). They are placed as shown on the previous schema.
- Conductors that come out of the connectors, as well as the reference conductors, are equipped with terminal lugs for connection to the electric ageing bench.
- On the part of the main conductor between the connectors, are installed :
 - ◊ a dismountable joint (contactor) to enable the resistance measures,
 - ◊ an impedance corrector to regulate intensity so that temperature of the reference main conductor remains between 110°C and 120°C.
- Reference conductors are stripped.

2. Assembly of the loop

- Conductors are inserted in the connector.
- Screw is tightened up to the 8,1N.m minimal torque.
- Conductors equipped with terminal lugs are linked between each other, to the electric ageing bench and to contactors by means of bolts.
- Voltage measure points are installed.
- Temperature measure points are installed as follows :

	TYPE OF THERMOCOUPLE	PLACE OF FIXING	TYPE OF HOLD
Connector	- type «K», «sheathed» in a tube of Inconel, - diameter 1 mm, - length 30 mm.	- at the lower part of the contact bridge, in a 1,2mm diameter hole	- covered with «thermoconductor» grease - holding with a mastic type «polyurethane»
Reference conductor	- type «K», «sheathed» in a tube of Inconel, - diameter 1 mm, - length 30 mm.	- at the middle of the reference conductor core	- holding through a splice (copper wire diameter 0,3mm) - covered with «thermoconductor» grease
Room temperature	- type «K», «sheathed» in a tube of Inconel, - diameter 1 mm, - length 30 mm.	- at the middle of the loop at 20cm under the horizontal level containing the connectors	/

ВЪРХНО С ОРГАНИЗАЦИЈА

"BAK - 02" ООД

 САМОКОВ

TEST DESCRIPTION : 2.8 Electric ageing test

Page 3/8

3. Process of a cycle

Heating at 120°C of the reference Cu 6mm ² conductor	Duration	5 min
	Intensity in the tap	~ 115A
	Intensity in the main	~ 430A
Step at 120°C of the reference Cu 6mm ² conductor	Duration	50 min
	Intensity in the tap	~ 85A
	Intensity in the main	~ 320A
Temperature measure every 10 cycle		
Cooling	Duration	30min
Resistance measure every 10 cycle		
Total duration of a cycle	Duration	85min

4. Performing of the test - Measures

- Resistance measure is performed under a direct current of 10A, every 10 cycle at the end of the cooling time.
- Resistance values are put down at 20°C before using and the real resistances of the connectors (R_j) are calculated according to § 5.3.3.4 of standard NF C 33-004.
- Test is composed of 200 electric ageing cycles.

ВАРНО С ОПРЕДЕЛЕНИЕТО



TEST DESCRIPTION : 2.8 Electric ageing test

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TEST RESULTS

TEMPERATURE RECORD
(in °C)

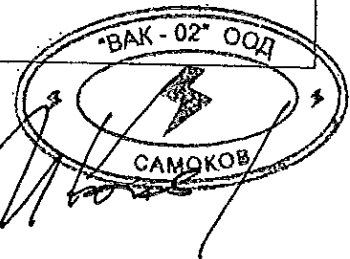
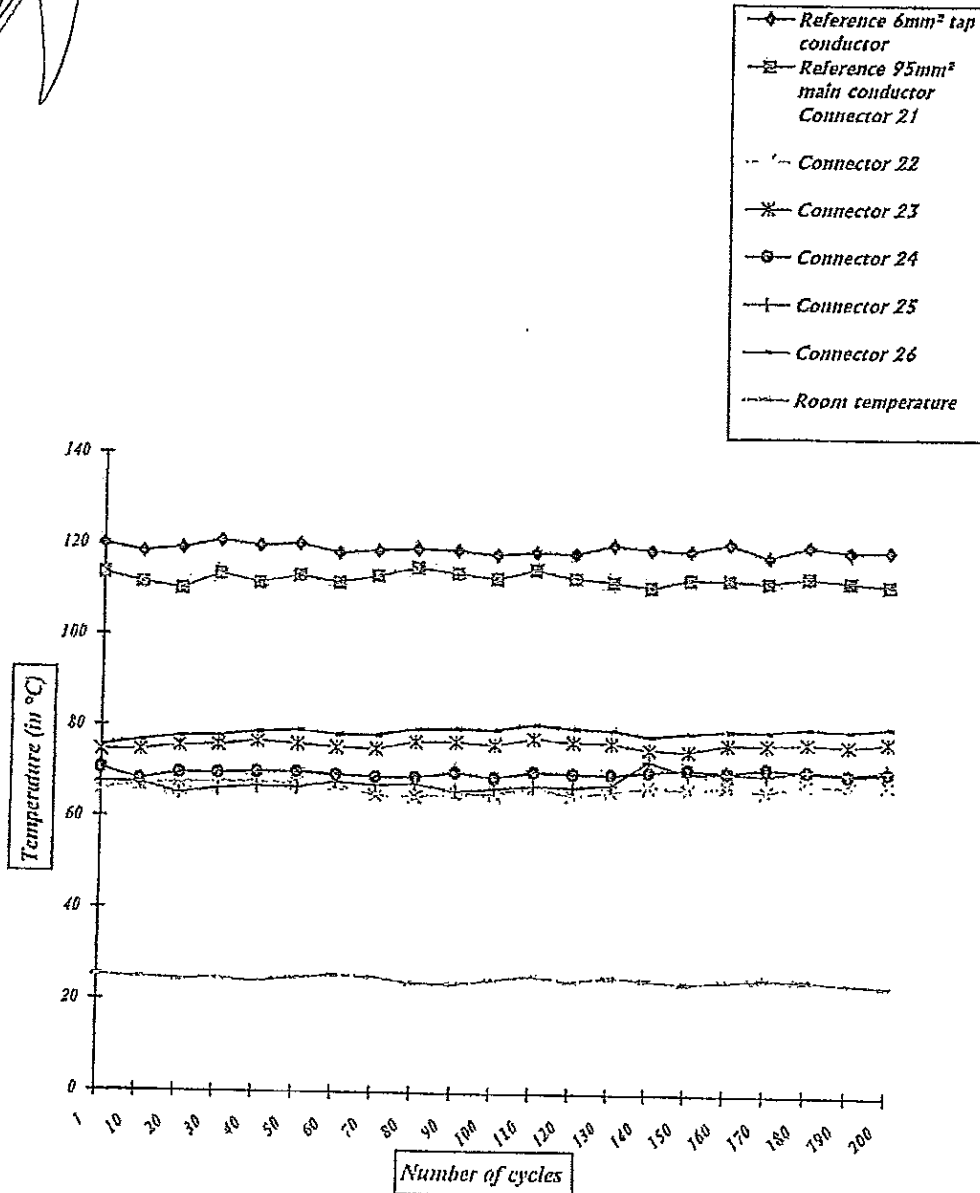
Cycles	Reference conductor		Connectors						Room temperature
	6mm ² tap	95mm ² main	21	22	23	24	25	26	
1	120,0	113,6	74,6	65,9	74,5	70,5	67,5	75,6	25,3
10	118,3	111,5	75,6	66,9	74,6	68,2	67,4	76,7	24,9
20	119,2	110,2	76,1	67,6	75,7	69,7	65,2	77,7	24,5
30	120,8	113,6	75,9	67,7	75,9	69,7	66,3	77,9	24,8
40	119,8	111,7	76,7	67,8	76,7	70,0	66,8	78,8	24,2
50	120,3	113,3	76,9	67,5	76,2	70,1	66,7	79,2	25,0
60	118,3	111,8	76,6	67,3	75,5	69,5	67,9	78,4	25,6
70	118,9	113,3	76,2	65,0	75,3	69,1	67,2	78,3	25,3
80	119,3	115,2	77,1	64,8	76,8	69,1	67,6	79,6	24,1
90	119,0	114,1	77,3	65,5	76,9	70,2	66,1	79,8	23,8
100	118,2	112,9	77,8	65,5	76,3	69,0	66,7	79,6	24,8
110	118,8	114,9	78,9	67,1	77,8	70,4	67,3	80,9	25,7
120	118,6	113,2	77,7	65,2	77,0	70,1	67,1	80,1	24,7
130	120,5	112,4	77,1	66,2	76,8	70,0	67,7	79,8	25,5
140	119,6	111,3	76,3	67,3	75,6	70,6	72,9	78,5	25,1
150	119,4	113,1	77,8	66,8	75,3	71,3	70,4	79,2	24,3
160	121,0	113,0	79,7	67,6	76,8	70,7	70,5	79,8	25,0
170	118,2	112,5	77,4	66,5	76,8	71,6	70,2	79,8	25,4
180	120,6	113,7	78,2	68,2	77,2	71,1	71,2	80,6	25,3
190	119,5	112,8	77,9	67,8	76,7	70,4	70,7	80,1	24,7
200	119,7	112,1	78,5	68,3	77,5	70,9	71,6	80,8	24,2

ВАРНО С ОПРАВИЛАТА



TEST DESCRIPTION : 2.8 Electric ageing test

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ВЪРНО С ОПРИГНАТА

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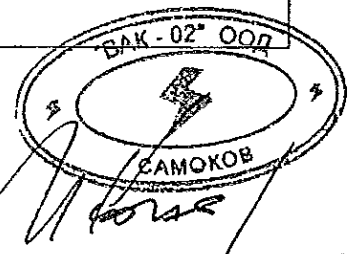
TEST DESCRIPTION : 2.8 Electric ageing test

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RESISTANCE RECORD
(in $\mu\Omega$)

Cycles	Connectors					
	21	22	23	24	25	26
0	212,6	191,8	190,6	179,0	189,8	186,5
10	249,1	227,6	311,5	242,7	223,3	224,4
20	253,6	231,5	213,5	258,9	233,7	232,1
30	263,0	237,7	216,2	267,6	249,4	238,7
40	272,9	243,1	218,7	280,5	253,4	246,8
50	271,5	245,2	220,0	282,0	257,7	244,9
60	276,4	248,9	222,2	285,9	266,5	255,0
70	283,2	253,7	224,0	288,2	271,4	258,0
80	285,3	257,1	227,0	290,4	275,4	259,7
90	287,7	261,9	228,7	290,9	284,1	266,1
100	290,7	264,0	228,7	293,5	286,3	267,5
110	292,6	265,6	229,5	296,4	291,8	270,7
120	291,7	265,9	229,7	295,5	293,7	270,4
130	294,1	266,5	230,6	294,6	292,0	271,4
140	298,5	267,3	231,0	301,9	295,7	271,5
150	299,2	268,0	232,1	302,0	296,9	273,1
160	299,7	268,3	232,6	304,1	297,8	273,3
170	302,1	269,4	232,8	311,4	301,3	274,2
180	303,9	270,5	233,8	312,6	304,7	273,8
190	304,5	271,3	234,3	313,0	305,6	274,7
200	305,1	271,9	234,7	313,7	306,4	275,5

ВАРНО С ОПРЕДЕЛЕНИЯТА



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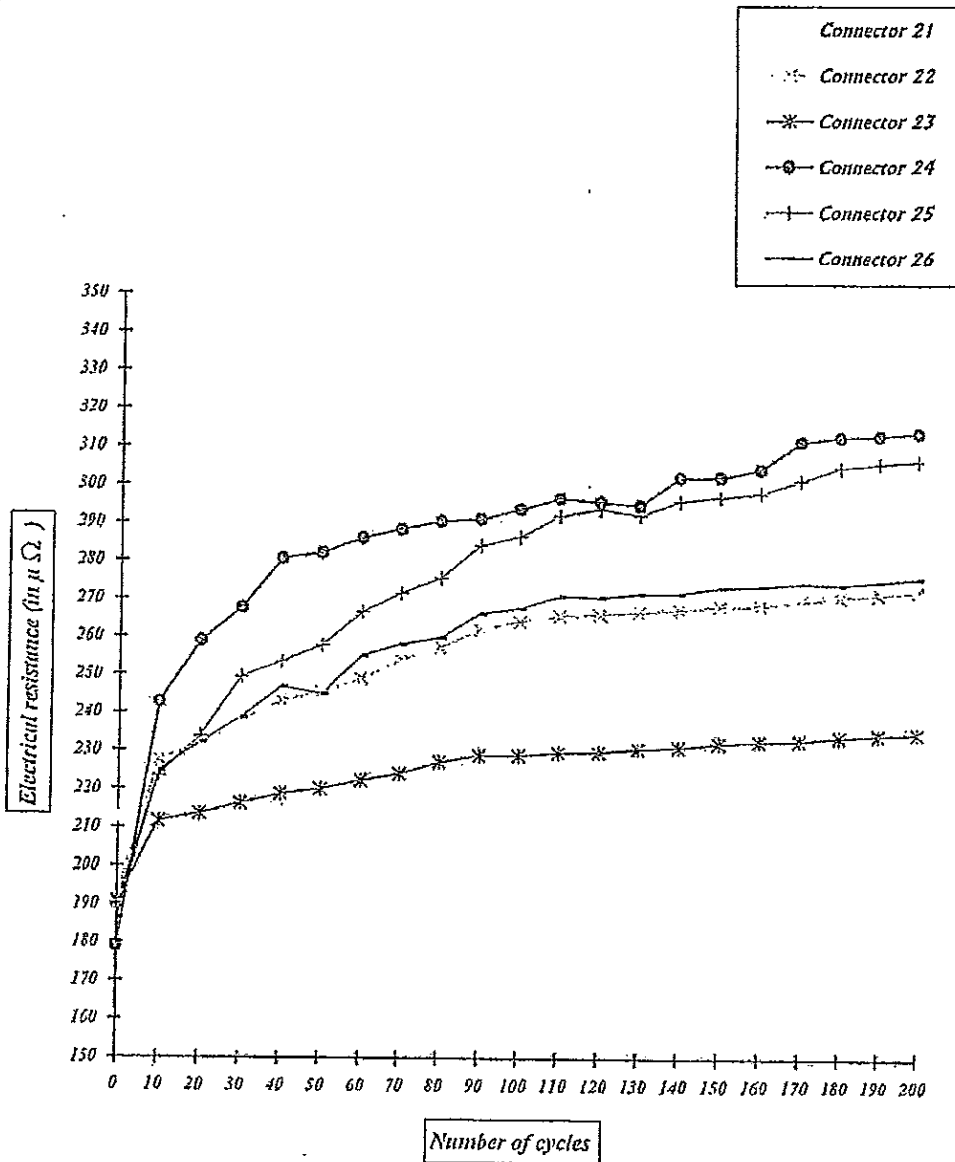
MICHAUD SA
TEST LABORATORY

TEST REPORT
INTERNAL QUALIFICATION TESTS OF CES/CTEC 95 (L 227) N° 130-10-14-01

Date : 02/09/2010
Page : 19/20

TEST DESCRIPTION : 2.8 Electric aging test

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ВАРНИК С ОПИТИВАНАТА



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СРЕДНА

TEST DESCRIPTION : 2.8 Electric ageing test

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The results are the ones of § 5.4 of standard NF C 33-004 which defines the following acceptance criteria :

Relative initial scatter of resistances : $\delta \leq 0,30$

Stability of resistances R_j (on the 11th last measures) : $\frac{\Delta R_j}{R_j} \leq 12\%$

Stability of temperatures θ_j (on the 11th last measures) :

$$\bar{d}_j - 10 \leq d_j \leq \bar{d}_j + 10$$

with : * $d_j = \theta_R - \theta_j$

* θ_R : temperature of the warmest reference core

$$\theta_j \leq \text{Max } \theta_R$$

Equivalent to check : $\text{Min } d_j \geq 0$

1) Temperature

SAMPLE N°	TEMPERATURE STABILITY (in K)			
	$\bar{d}_j - 10$	Min d_j	Max d_j	$\bar{d}_j + 10$
21	31,5	39,9	43,4	51,5
22	42,5	51,4	54,3	62,5
23	32,8	41,0	44,2	52,8
24	38,9	46,6	50,5	58,9
25	39,8	46,7	52,8	59,8
26	29,5	37,9	41,2	49,5

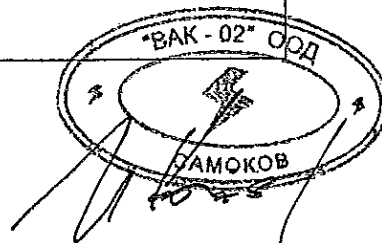
2) Resistance

Initial scatter : $\delta = 0,097$

SAMPLE N°	RESISTANCE STABILITY (in %)	$\frac{\Delta R_j}{R_j}$
21	4,8	
22	2,9	
23	2,6	
24	6,7	
25	6,8	
26	2,9	

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ВАРНО С ОРБИНАЛА



СПИСЪК НА ОТДЕЛНИТЕ ИЗПИТВАНИЯ НА ИЗОЛИРАНА КЛЕМА ТИП I227

№ на тест: 130-10-14-01

2.3.1 Проверка на електрическата връзка, чупливост на главата и механична якост на клемата.....5

2.3.2 Влияние на затягането върху механичната якост на главния проводник.....6

2.3.3 Контрол на механичната якост на разклонителните жила.....7

2.4. Диелектричен тест.....8

2.5. Тест за монтаж при ниска температура.....9

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2.7. Тест за устойчивост на корозия.....12

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Съставил:

На основание чл. 2
от ЗЗЛД

LABORATOIRE D'ESSAIS
TEST LABORATORY

Date : 28/11/97
Date : 28/11/97

RAPPORT D'ESSAIS TEST REPORT

ESSAIS DE QUALIFICATION
DES IPC BARE AL 50 - 240 / ABC 35 - 150
(K 475)
N° 028-97-37-10

QUALIFICATION TESTS OF
IPC BARE AL 50 - 240 / ABC 35 - 150
(K 475)
N° 028-97-37-10

DEMANDEUR : Bureau d'Etudes MICHAUD SA
REQUESTED BY: MICHAUD SA's Research Department

PRESENTATION : Ce document regroupe les essais de qualification des IPC BARE AL 50 - 240 / ABC 35 - 150 (K 475).
Les matériels testés sont de fabrication MICHAUD SA.

Les modalités d'essais retenues sont celles de la norme Australienne et Néo-Zélandaise expérimentale AS/NZS 4396 de 1996 et de la norme française C 33-020 d'Avril 1997.

INTRODUCTION : *This document gathers the qualification tests of connector IPC BARE AL 50 - 240 / ABC 35 - 150 (K 475). Tested products are of MICHAUD's manufacture.*

Test procedures are the ones of the interim Australian and New Zealand standard AS/NZS 4396 of 1996 and of the French standard C33-020 of April 1997.

На основание чл. 2
от ЗЗЛД

Date : 28/11/1997

Date : 28/11/1997

DIFFUSION : Le 28/11/1997 - 1 exemplaire original UR (LE)
Le 08/07/2010 - 1 exemplaire original LOBUT AK (Bulgarie)
- 1 exemplaire original COM (Classement Client)

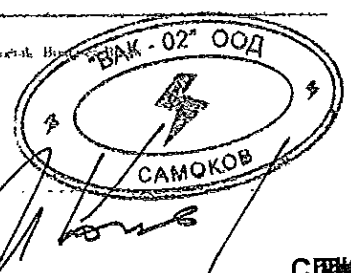
ISSUANCE : On the 28/11/1997 - 1 original to UR (LE)
On the 08/07/2010 - 1 original to LOBUT AK (Bulgaria)
- 1 original to COM (Customer filing)

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Any copy of this test report is authorized only as a complete content after written authorization from the test laboratory of MICHAUD SA. The test report hereafter concerns only the samples tested.

Ce document comporte 15 pages (y compris la présente page 1).
This document includes 15 pages (including this page 1).

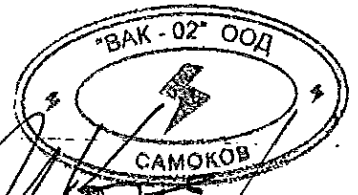
ВАРНО С ОРМИНАТА



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ВЪРНО С ОПРИГНАЛАТА



I) INTRODUCTION

1.1 Subject

This document gathers the qualification tests of IPC BARE AL 50 - 240 / ABC 35 - 150 (K 475). Tested products are of MICHAUD's manufacture.

Test procedures are the ones of the Interim Australian and New Zealand standard AS/NZS 4396 of 1996 and of the French standard C 33-020 of April 1997.

For each test, there is a test sheet gathering procedures and results.

1.2 Tested products

Tested products are insulation piercing connectors according to the technical file «CDR/CT EC». These products are coming from an industrial series.

DESIGNATION	CODE	N° OF BATCH
IPC BARE AL 50 - 240 / ABC 35 - 150	K 475	97-42-00

1.3 Order of tests

Samples are numbered from 1 to 26.

NUMBER OF SAMPLES	TESTS
1 to 4	Low temperature assembly test
5 to 8	Control of the electric continuity, torque limiters and mechanical strength of the connector
9 to 14	Electrical ageing test
15 to 20	Water penetration test with heat cycles
21 to 26	Water penetration test without heat cycles

II) STANDARD DOCUMENTS REFERRED TO IN THIS REPORT

- French standards

- NF C 32-321 : April 1982 + Additive 1 of April 1993,
«Insulated cables and flexible cores for installation - Cross-linked polyethylene insulated cables covered with polyvinyl chloride sheath - Series U - 1000 R2V».
- C 33-020 : April 1997,
«Insulated cables and their accessories for power systems - Insulation piercing branch - connectors for overhead distributions and services of rated voltage 0,6/1kV with bundle assembled cores».
- NF C 33-209 : July 1996,
«Insulated or protected cables for power systems - Bundle assembled cores for overhead systems of rated voltage 0,6/1kV».



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СИГНАЛ
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- Interim Australian and New Zealand standard

AS/NZS 4396 : 1996,

«Connectors - Insulation Piercing - For 0,6/1kV Aerial Bundled Cable».

III) GENERAL CONDITIONS

• Temperature

Tests are carried out at the room temperature of the test laboratory.

• Conductors used

REFERENCE STANDARD	COME FROM	NOMINAL CROSS-SECTIONAL AREA (in mm ²)	TYPE OF CORE	NUMBER OF RIBS	NUMBER OF STRANDS AND COMPOSITION OF CONDUCTOR	NATURE OF INSULANT	Ø OVER RIBS (in mm)	Ø OVER CONDUCTOR (in mm)
/	Australia	150	Neutral	24	24 strands Aluminium	XLPE	18,2	14,2
/	Australia	35	Neutral	14	7 strands Aluminium	XLPE	10,4	7,1
NF C 33-321	Alcatel Câble	240	U-1000A R02 V	/	7 strands Aluminium	Used stripped	/	19,2
NF C 33-209	Câblerie de Lens	50	Phase	/	7 strands Aluminium	Used stripped	/	8,2

Before tests are being completed according to the standard C 33-020 dated April 1997, cores are conditioned, according to § 2.2.2, as follows : they are put in an enclosure during 1 h at 120°C, then the door of the enclosure is opened so that cores cool to room temperature.

Note : Aluminium cores used stripped are brushed with neutral grease before assembly.

IV) TESTS

On the following pages, sheets of each performed test can be found.

ВАРНО С ОПРИМНАТА



MICHAUD SA TEST LABORATORY	TEST REPORT QUALIFICATION TESTS OF IPC BARE AJ 50 - 240 / ABC 35 - 150 (K 475) N° 028-97-37-10	Date : 28/11/97 Page : 5/15
-------------------------------	---	--------------------------------

<u>TEST DESCRIPTION</u> : Low temperature assembly test	Page 1/1
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DATE : ON THE 27/10/1997 PLACE : MICHAUD test laboratory	OPERATOR : N. PETITJEAN
---	-------------------------

N° OF SAMPLES : 1 to 4

<u>TEST EQUIPMENTS</u>	<u>PROCEDURES</u>	
	N°	TITLE
- Enclosure with regulated temperature - 25°C + 45°C - Dynamometric equipment GRIN 15N.m and 70N.m - DIGIPINCE II clamp-on probe	1	General
	1	General
	1	General

<u>TEST CONDITIONS</u>
General conditions

<u>PROCEDURES</u>
<p>Procedures and acceptance criteria are the ones of § 2.5 of standard C 33-020 dated April 1997.</p> <p>Each connector is fitted on the main and tap cores. The assembly is installed in the enclosure with regulated temperature - 25°C + 45°C, at a temperature of - 11°C.</p> <p>After one hour, the assembly being kept in the enclosure, the DIGIPINCE II clamp-on probe is connected to the assembly, in order to check that current flows.</p> <p>Screws of the connector are then tightened up to 0,7 times the minimal torque until shear-head breaks : 15,7N.m.</p> <p>At 0,7 times the minimal torque, contact shall be established between cores.</p>

<u>TEST RESULTS</u>

N° OF SAMPLES	SECTION OF CORES (in mm ²)		COMMENTS
	MAIN	TAP	
1	50	150	Contact is established
2	50	150	Contact is established
3	240	150	Contact is established
4	240	150	Contact is established

ВЪРНО С ОРИГИНАЛА



MICHAUD SA TEST LABORATORY	TEST REPORT QUALIFICATION TESTS OF IPC BARE AL 50 - 240 / ABC 35 - 150 (K 475) N° 028-97-37-10	Date : 28/11/97 Page : 6/15
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TEST DESCRIPTION : Control of the electric continuity, torque limiters and mechanical strength of the core Page 1/1

DATE : ON THE 28/10/1997
PLACE : MICHAUD test Laboratory **OPERATOR :** N. PETITJEAN

N° OF SAMPLES : 5 to 8

<u>TEST EQUIPMENTS</u>	N°	<u>PROCEDURES</u> TITLE
- Dynamometric equipment GRIN 15N.m and 70N.m	1	General
- DIGIPINCE II clamp-on probe	1	General
- Tightening test machine (UP K)	1	General

TEST CONDITIONS

General conditions

PROCEDURES

Procedures and acceptance criteria are the ones of § 2.3.1 of standard C 33-020 dated April 1997.

Main core is strained. Tensile strength on the conductor is the following :

- 1,30kN for 50mm² core,
- 5,80kN for 240mm² core.

The connector is fitted on the strained main core and a tap core. It is tightened up to 0,7 times the minimal torque (15,7N.m) : contact shall be established between the cores (this is checked by means of the DIGIPINCE II clamp-on probe).

Then, it is tightened until shear-heads break, obtained values are recorded. It shall be comprised between the margins given by the manufacturer ($\pm 10\%$ of the nominal torque).

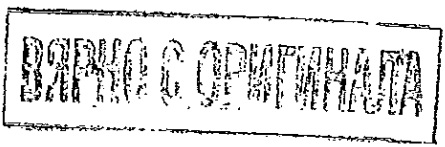
Then, tightening is performed up to 1,5 times the maximal torque (41,3N.m).

No breakage of the connector or the conductor shall occur.

TEST RESULTS

N° OF SAMPLES	SECTION OF CORES (in mm ²)		COMMENTS AFTER TIGHTENING AT 0,7 TIMES THE MINIMAL TORQUE	SHEAR-HEAD BREAKAGE TORQUE (in N.m)		COMMENTS AFTER TIGHTENING AT 1,5 TIMES THE MAXIMAL TORQUE
	MAIN	TAP				
5	50	150	Contact is established	25,8	26,3	Satisfactory
6	50	150	Contact is established	26,2	25,8	Satisfactory
7	240	150	Contact is established	27,1	24,6	Satisfactory
8	240	150	Contact is established	25,1	26,1	Satisfactory

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TEST DESCRIPTION : Electrical ageing test Page 1/5

DATE : FROM 31/10/1997 TO 26/11/1997 OPERATOR : N. PETITJEAN
PLACE : MICHAUD test laboratory

N° OF SAMPLES : 9 to 14

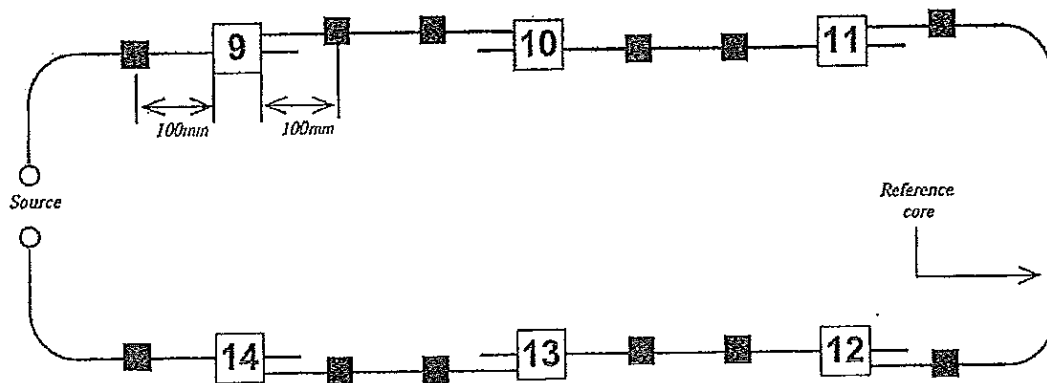
TEST EQUIPMENTS	N°	PROCEDURES TITRE
<ul style="list-style-type: none"> - Humid heat enclosure - Dynamometric equipment CRIN 15N.m et 70N.m - N° 2 electrical ageing bench 	<ul style="list-style-type: none"> 1 1 6 	<ul style="list-style-type: none"> General General Electrical ageing according to the interim Australian and New Zealand standard AS/NZS 4396
<ul style="list-style-type: none"> - Measure station SA 70 N2 - Printer LQ 860 N2 	<ul style="list-style-type: none"> 1 1 	<ul style="list-style-type: none"> General General

TEST CONDITIONS

General conditlons

PROCEDURES

Procedures and acceptance criteria are the ones of Appendix C of the Interim Australian and New-Zealand standard AS/NZS 4396 of 1996. Test loop is the following :



LEGEND

<p>□ Connector</p> <p>— 150mm² Australian core (Aluminium)</p>	<p>■ Voltage measure point</p>
--	--------------------------------

ВЪПРОС С ОПИТИВАНАТА



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TEST DESCRIPTION: Electrical ageing test

Page 2/5

1. Preparation of the loop

Voltage measures are performed by means of equalizers (welding method : «TIG», metal filler : aluminium 1 050A). A 2mm diameter hole is pierced in them.
Voltage measure points are installed at 100mm of the connectors exit.

- In order to measure overheating, a 1,2 mm diameter hole is pierced in the lower body, at the level of the contact bridge, on mains side.
- Conductors that provide the link to the electrical ageing bench, are equipped with compression lugs.
- Before assembly, cores are conditioned at 90°C for 24 hours.

2. Assembly of the loop

- The connectors are fitted on 150 mm² bare on main side and insulated on tap side. Screws are tightened alternatively by step of 5N.m at the minimal torque (22,5N.m).
- Cores equipped with lugs are linked to the electrical ageing bench by means of bolts.
- Voltage measure points are installed.
- Temperature measure points are installed as follows :

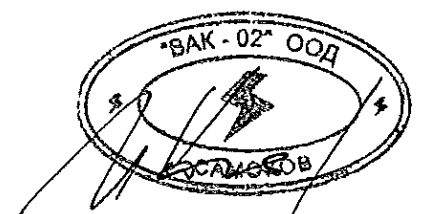
	TYPE OF THERMOCOUPLE	PLACE OF FIXING	TYPE OF HOLD
Connector	- type «k», «sheathed» in a tube of Inconel, - diameter 1 mm, - length 30 mm.	- at the level of the contact bridge on mains side, in a 1,2mm diameter hole.	- covered with «thermoconductor» grease - holding with a mastic type «polyurethane»
Reference core	- type «k», - diameter 0,5 mm.	- in the middle of the conductor of the reference core under insulant that has been slotted.	- covered with «thermoconductor» grease
Room temperature	- type «k», «sheathed» in a tube of inconel, - diameter 1 mm, - length 30 mm.	- In the center of the loop at 20cm under the horizontal level containing the connectors.	/

3. Process of a cycle

Heating at 122°C of the reference core	Duration	7 min
	Intensity	~ 760A
Step at 122°C of the reference core	Duration	10 min
	Intensity	~ 510A
Temperature measure every 50 cycles		
Cooling	Duration	30 min
Resistance measure every 50 cycles (from 1 st to 250 th cycle)		
Resistance measure every 25 cycles (from 250 th to 500 th cycle)		
Total duration of a cycle	Duration	47 min

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ВАРНО С ОРГАННАТА



TEST DESCRIPTION : Electrical ageing test

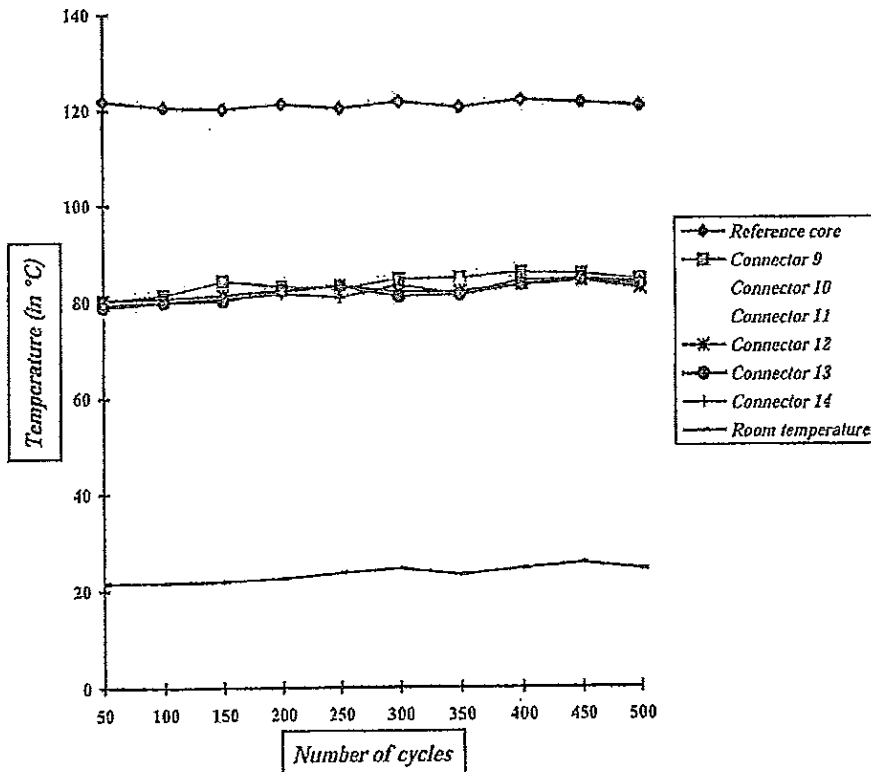
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TEST RESULTS

TEMPERATURE RECORD
(in °C)

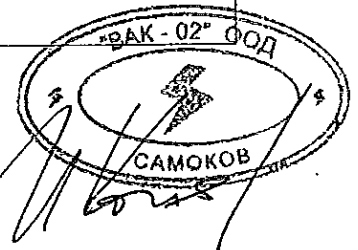
Remark : for each series of measures, this table contains the maximal values measured during the last 5 cycles for the last 5 minutes of the overheating step.

Cycles	Reference core	Connector 9	Connector 10	Connector 11	Connector 12	Connector 13	Connector 14	ROOM TEMPERATURE
50	121,8	80,3	79,2	77,3	80,3	78,8	79,5	21,5
100	120,5	81,3	79,5	78,2	80,6	79,9	79,9	21,6
150	120,2	84,2	80,3	79,3	81,3	80,1	80,5	21,9
200	121,2	83,1	81,2	79,5	82,2	82,2	81,6	22,5
250	120,3	82,5	83,1	80,2	83,3	83,1	80,8	23,6
300	121,6	84,6	82,1	80,5	81,8	80,9	83,3	24,5
350	120,4	84,7	84,3	79,8	81,9	81,3	84,4	23,2
400	121,8	85,8	82,3	79,5	83,2	83,3	84,1	24,5
450	121,3	85,4	83,6	78,6	84,1	84,4	84,4	25,6
500	120,6	84,3	84,2	79,5	82,5	83,2	83,8	24,3



Results are satisfactory : - temperature of connectors is always lower than the reference core temperature.

ВАРНО В ОПИТАНАТА

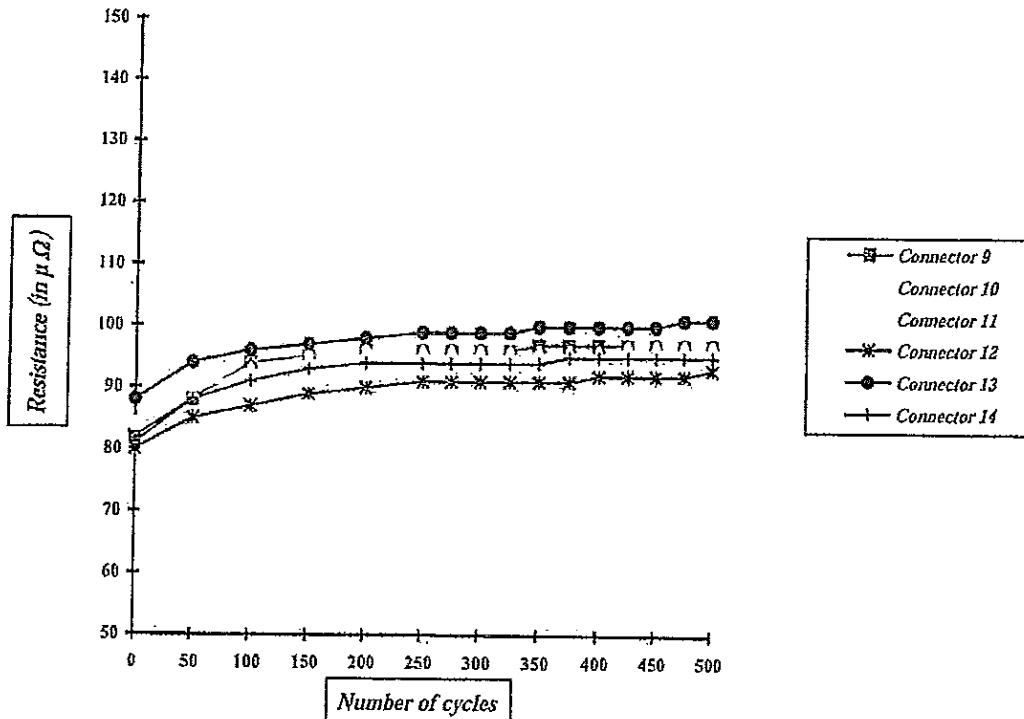


TEST DESCRIPTION: Electrical ageing test

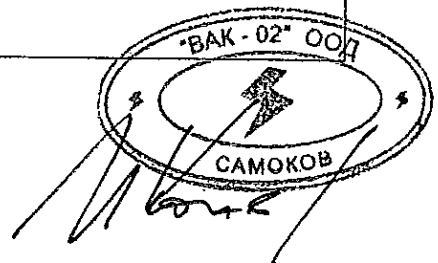
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RESISTANCE RECORD
(in $\mu\Omega$)

Cycles	Connector 9	Connector 10	Connector 11	Connector 12	Connector 13	Connector 14
0	82	84	85	80	88	81
50	88	89	92	85	94	88
100	94	93	95	87	96	91
150	95	95	96	89	97	93
200	96	96	97	90	98	94
250	96	96	98	91	99	94
275	96	96	98	91	99	94
300	96	96	98	91	99	94
325	96	96	99	91	99	94
350	97	96	99	91	100	94
375	97	96	99	91	100	95
400	97	96	99	92	100	95
425	97	97	99	92	100	95
450	97	97	99	92	100	95
475	97	97	99	92	101	95
500	97	97	99	93	101	95



ВАРНО С ОБЯЗАНОСТА



TEST DESCRIPTION : Electrical ageing test

Page 5/5

**STATISTICAL ASSESSMENT OF
ELECTRICAL RESISTANCE MEASURES**
(in $\mu\Omega$)

(between the 250th and the 500th cycle)

PARAMETERS	CONNECTOR 9	CONNECTOR 10	CONNECTOR 11	CONNECTOR 12	CONNECTOR 13	CONNECTOR 14
Mean \bar{R}	96,6	96,4	98,7	91,5	99,8	94,5
Slope B	1,273	1,273	1,091	1,818	2,091	1,364
Variation M	0,132	0,132	0,110	0,199	0,209	0,144
Scatter S	0,029	0,029	0,024	0,043	0,046	0,031
D	0,160	0,161	0,135	0,242	0,255	0,176

Parameters are calculated as follows :

$$\bar{R} = \frac{R_1 + R_2 + R_3 + R_4 + R_5 + R_6 + R_7 + R_8 + R_9 + R_{10} + R_{11}}{11} \quad \text{(Mean of the electrical resistances measured between the 250th and the 500th cycle)}$$

$$B = \frac{-5R_1 - 4R_2 - 3R_3 - 2R_4 - R_5 + R_7 + 2R_8 + 3R_9 + 4R_{10} + 5R_{11}}{11}$$

$$M = \frac{10B}{\bar{R}}$$

$$S = \frac{2,07}{\bar{R}} \times \sqrt{\frac{A_1^2 + A_2^2 + A_3^2 + A_4^2 + A_5^2 + A_6^2 + A_7^2 + A_8^2 + A_9^2 + A_{10}^2 + A_{11}^2}{9}}$$

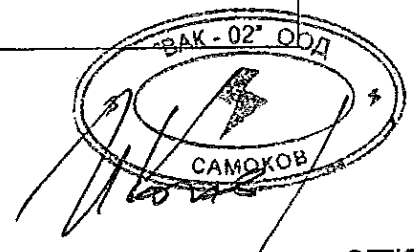
with :

$$\begin{aligned} A_1 &= R_1 - \bar{R} + 5B & A_4 &= R_4 - \bar{R} + 2B & A_7 &= R_7 - \bar{R} - B & A_{10} &= R_{10} - \bar{R} - 4B \\ A_2 &= R_2 - \bar{R} + 4B & A_5 &= R_5 - \bar{R} + B & A_8 &= R_8 - \bar{R} - 2B & A_{11} &= R_{11} - \bar{R} - 5B \\ A_3 &= R_3 - \bar{R} + 3B & A_6 &= R_6 - \bar{R} & A_9 &= R_9 - \bar{R} - 3B \end{aligned}$$

$$D = M + S$$

Results are satisfactory

ВАРНО С ОРГАНИЗАТА



MICHAUD SA
TEST LABORATORY

TEST REPORT
QUALIFICATION TESTS OF IPC BARE AI 50 - 240 / ABC 35 - 150 (K 475)
N° 028-97-37-10

Date : 28/11/97
Page : 12/15

TEST DESCRIPTION : Water penetration test with heat cycles

Page 1/2

DATE : FROM 27/10/1997 TO 31/10/1997

PLACE : MICHAUD test laboratory

OPERATOR : N. PETITJEAN

N° OF SAMPLES : 15 to 20

TEST EQUIPMENTS

PROCEDURES
TITLE

- Humid heat enclosure
- Dynamometric equipment GRIN 15N.m et 70N.m
- N° 1 electrical ageing bench

N°

1	General
1	General
6	Electrical ageing according to the interim Australian and New Zealand standard AS/NZS 4396
1	General
1	General

- Measure station SA70N1
- Immersion heater + 150°C

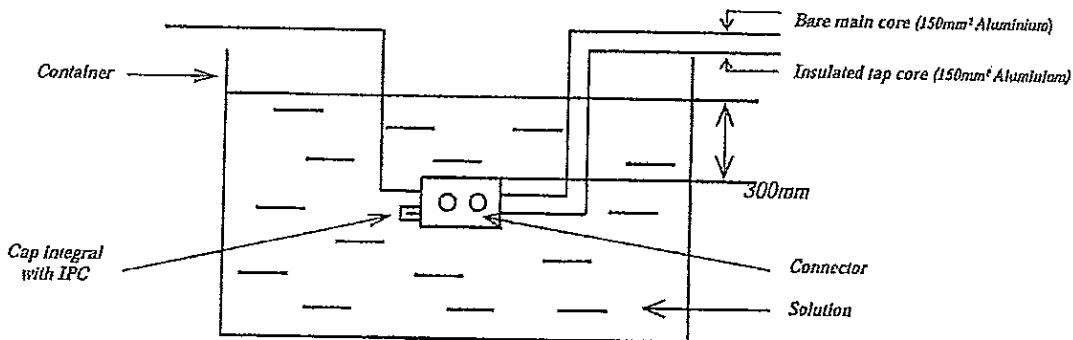
TEST CONDITIONS

General conditions

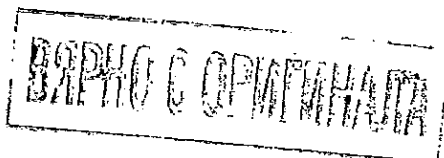
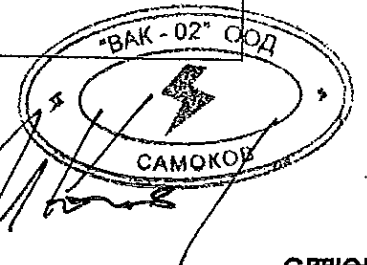
PROCEDURES

Procedures and acceptance criteria are the ones of § D 7.2 of the interim Australian and New Zealand standard AS/NZS 4396 dated 1996.

- 1) Before assembly, 150 mm² Australian insulated Aluminium cores are conditioned at 90°C for 24 hours.
- 2) The connectors are fitted on 150mm² bare Aluminium cores on the main side and on insulated cores on the tap side (insulation piercing side). Screws are tightened alternatively by step of 5N.m at the minimal torque (22,5N.m). The tap core is terminated in the IPC cap filled with grease (as per normal production).
- 3) Then, connectors are immersed in a container filled with a solution of 3% NaCl by weight containing a fluorescent dye (fluorescine), as shown below :



- 4) The solution is maintained at a temperature of 20°C for 24 hours.
- 5) Connectors are removed from the solution. They are fitted in a loop, with a reference core, in order to realise 15 heat cycles according to the following steps :
 - a) an alternating current is passed through the loop. It has a sufficient magnitude to raise the temperature of the 150mm² aluminium reference core to 122°C,
 - b) the temperature of the reference conductor is maintained at 122°C for 10 minutes,
 - c) the current is switched off to allow the reference core to cool to room temperature,



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TEST DESCRIPTION : Water penetration test with heat cycles Page 2/2

d) process of a cycle :

Heating à 122°C of the reference core	Duration	35min
	Intensity	~ 750A
Step at 122°C of the reference core	Duration	10min
	Intensity	~ 510A
Cooling	Duration	30min
Total duration of a cycle		75min

- 6) The loop is disassembled and the connectors are placed again in the container as in step 3). The solution is maintained, due to a thermostatic bath, at a temperature of 50°C for 48 hours.
- 7) Connectors are removed from the solution and are dried.
- 8) Connectors are opened by sawing when cooled down to room temperature.
- 9) Core surfaces and insulation are examined using an ultra-violet light in order to detect the presence of water.

Acceptance criteria is the following : no penetration of the solution in the conductor.

TEST RESULTS

N° OF SAMPLES	SECTION OF CORES (in mm²)		COMMENTS ON INSULATED CORE AFTER DISASSEMBLY	
	TAP	MAIN	CONNECTOR	CORE
15	150	150	Satisfactory	Satisfactory
16	150	150	Satisfactory	Satisfactory
17	150	150	Satisfactory	Satisfactory
18	150	150	Satisfactory	Satisfactory
19	150	150	Satisfactory	Satisfactory
20	150	150	Satisfactory	Satisfactory

ВЪРНО С ОПРИМНАТА

"BAK - 02" ООР

 САМОКОН

MICHAUD SA TEST LABORATORY	TEST REPORT QUALIFICATION TESTS OF IPC BARE AI 50 - 240 / ABC 35 - 150 (K 475) N° 028-97-37-10	Date : 28/11/97 Page : 14/15
--------------------------------------	---	---------------------------------

TEST DESCRIPTION : Water penetration test without heat cycles Page 1/2

DATE : FROM 21/11/1997 TO 05/11/1997
PLACE : MICHAUD test Laboratory **OPERATOR :** N. PETITJEAN

N° OF SAMPLES : 21 to 26

<u>TEST EQUIPMENTS</u>	N°	<u>PROCEDURES</u> TITLE
- Humid heat enclosure - Dynamometric equipment GRIN 15N.m et 70N.m	1 1	General General

TEST CONDITIONS

General conditions

PROCEDURES

Procedures and acceptance criteria are the ones of Appendix D (procedure II) of the interim Australian and New Zealand standard AS/NZS 4396 dated 1996.

- 1) Before assembly, cores are conditioned at 90°C for 24 hours.
- 2) The connectors are fitted on 240mm² bare aluminium cores on main side and on 35mm² insulated aluminium cores on tap side. Screws are tightened alternatively by step of 5N.m at the minimal torque (22,5N.m). The tap core is terminated in the IPC cap filled with grease (as per normal production).
- 3) Then, assembly connector - cores are immersed in a container filled with a solution of 3% NaCl by weight containing a fluorescent dye (fluoresceine), as shown below :

The diagram illustrates the test setup. A rectangular container is partially filled with a solution. A connector is positioned inside the container, with its main side connected to a 'Bare main conductor (240mm² Aluminium)' and its tap side connected to an 'Insulated tap conductor (35mm² Aluminium)'. The tap conductor is terminated with a 'Cap integral with IPC'. A vertical dimension line indicates a height of 300mm from the top of the tap conductor to the top of the solution. Labels include 'Container', 'Cap integral with IPC', 'Connector', and 'Solution'.

- 4) The solution is maintained at a temperature of 20°C for 48 hours.
- 5) Connector - cores are removed from the solution and are dried.
- 6) Connectors are disassembled.
- 7) Core insulant is removed where the connector was placed.
- 8) Core surfaces and insulant are examined using an ultra-violet light in order to detect the presence of water.

Acceptance criteria is the following : no penetration of the solution in the conductor.

ВЪРНО С ОРИГИНАЛАТА

ВАК - 02° ООД

 САМОКОВ

MICHAUD SA TEST LABORATORY	TEST REPORT QUALIFICATION TESTS OF IPC BARE A150 - 240 / ABC 35 - 150 (K475) N° 028-97-37-10	Date : 28/11/97 Page : 15/15
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TEST DESCRIPTION : Water penetration test without heat cycles

Page 2/2

TEST RESULTS

N° OF SAMPLES	SECTION OF CORES (in mm ²)		COMMENTS AFTER 48h UNDER 300 mm OF SOLUTION AT 20°C	COMMENTS AFTER DISASSEMBLY	
	MAIN	TAP		CONNECTOR	CORE
21	240	35	Satisfactory	Satisfactory	Satisfactory
22	240	35	Satisfactory	Satisfactory	Satisfactory
23	240	35	Satisfactory	Satisfactory	Satisfactory
24	240	35	Satisfactory	Satisfactory	Satisfactory
25	240	35	Satisfactory	Satisfactory	Satisfactory
26	240	35	Satisfactory	Satisfactory	Satisfactory

50

50

ВЯРНО С ОПИТЕЛАТА



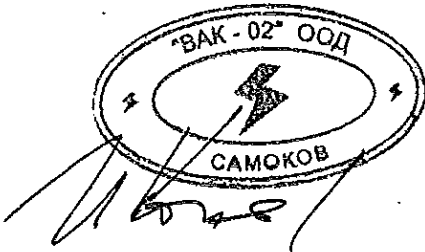
СПИСЪК НА ОТДЕЛНИТЕ ИЗПИТВАНИЯ НА ИЗОЛИРАНА КЛЕМА К475

1. № на тест: 028-97-37-10:

Тест за монтаж при ниска температура.....	5
Проверка на електрическата връзка, чупливост на главата и механична якост на клемата.....	6
Тест за стареене под въздействие на електричество.....	7
Тест за водонепропускливост с топлинни цикли.....	12
Тест за водонепропускливост без топлинни цикли.....	14

Съставил:

На основание чл. 2
от ЗЗЛД





sicame

Laboratoire d'essais
Direction Etudes et Recherches

Test report	: Checking electrical continuity, shearheads and mechanical behaviour of the connector
Test number	: 0500330
Product brand	: SICAME
Product type	: NTD 201 AFA

Demander of the test : Commercial direction

Starting date of the test : 19/09/2005

Report emission date : 20 SEP. 2005

According to standard : NFC 33 020 § 2.3.1 (june 98)

This report contains : 4 pages and 1 annex

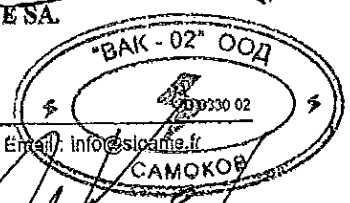
Conclusion : The tested SICAME LV insulation piercing connectors type NTD 201 AFA conform to the requirements of NFC 33 020 § 2.3.1 (june 98) standard.

This is an English translation, The original French test report is the only reference version

На основание чл. 2
от ЗЗЛД

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ВЯРНО С ОРГАНИЗАЦИЯТА



1 Equipment used during test

1.1 Equipment used

N° U.T.	Designation	Characteristics
94 02 56	Tightening test machine according to annex C of NF C 33-020 standard	Time : Accuracy 0,2 s Torque : Accuracy 4% Strength : Accuracy 4%
88 00 04	Plotter	/
97 02 02	Calibrated ruler	Accuracy 1 mm

1.2. Cables

	Main cable	Main cable	Tap cable
Section (mm ²)	34,4	75,5	35
Nature	Almelec	Almelec	Aluminium
Standard	C 34-125	C 34-125	NF C 33-209
From	France	France	France
Identification n°	5001	5186	2017
Conditioned on	/	/	The 11/08/2005 (1h00 at 120°C)

2 Product tested

Designation : NTD 201 AFA
 Number : 4
 Batch number : 05 S 848220
 Marking : See annex 1
 Identification : 1 and 2 for 34,4 mm² main cross-section
 3 and 4 for 75,5 mm² main cross-section
 Reception date at the laboratory : on the 19/09/2005

На основание чл. 2
от ЗЗЛД

ВАРНО С ОПТИМАТА

3 Test procedure

Connectors are tested according to NFC 33 020 § 2.3.1 (june 98) standard.

3.1 Procedure

Connectors are loosely installed on the main core and on the tap core with stranded conductor corresponding to the smallest and largest cross-sections on the main core and to the largest cross-section on the tap core. For this purpose, the main cable is stretched, and the tensile strength is indicated in the standard.

Connectors are tightened using the test machine described in the annex C of NFC 33 020 § 2.3.1 (june 98) standard.

Tightening is carried out up to 0,7 times the minimum torque indicated by the manufacturer then up to the breakdown of the shearhead and, lastly, up to 1,5 times the maximum torque indicated by the manufacturer.

For a connector fitted with two screws on the same core, after the breakdown of the shearheads, tightening may be carried out manually and alternatively using torque meter. The tightening conditions shall be as close as possible to those defined for the use of the test machine described in annex C.

3.2 Test

Connectors 1 and 2 are installed with 34,4 mm² main core and 35 mm² tap core. The main core tensile strength shall be between 2,23 kN and 2,79 kN.

Connectors 3 and 4 are installed with 75,5 mm² main core and 35 mm² tap core. The main core tensile strength shall be between 4,91 kN and 6,14 kN.

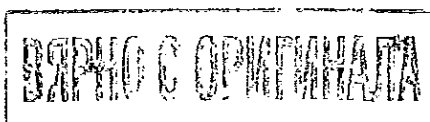
4 Requirements

At 0,7 times the minimum torque, electrical contact shall have occurred between the cores as per sub-clause 2.2.8 in the same standard.

Maximum shearhead torques measured shall be within the range of the minimum and maximum torques indicated by the manufacturer.

At 1,5 times the maximum torques indicated by the manufacturer, there shall be no breakdown of the connector or the core conductor.

На основание чл. 2
от ЗЗЛД



5 Results

	Standard requirements	Results
Ambient temperature and humidity conditions	Between 15 and 35°C Between 25 % and 75 % HR	21 °C 40 % HR
Tensile strength (kN)	For 34,4 mm ² : between 2,23 and 2,79 For 75,5 mm ² : between 4,91 and 6,14	For 34,4 mm ² : 2,7 For 75,5 mm ² : 5,1
Electrical contact torque (N.m)	$\leq 0,7 \times 13$ that is 9,1	Connector 1 : OK Connector 2 : OK Connector 3 : OK Connector 4 : OK
Shearhead breakdown torque (N.m)	F1314 that is between 13 and 16	Connector 1 : OK Connector 2 : OK Connector 3 : OK Connector 4 : OK
Connector breakdown torque (N.m)	$\geq 1,5 \times 16$ that is 24	Connector 1 : OK Connector 2 : OK Connector 3 : OK Connector 4 : OK

6 Conclusion

At 0,7 times the minimum torque, electrical contact have occurred between the cores as per sub-clause 2.2.8 in the same standard.

Maximum shearhead torques measured were within the range of the minimum and maximum torques indicated by the manufacturer.

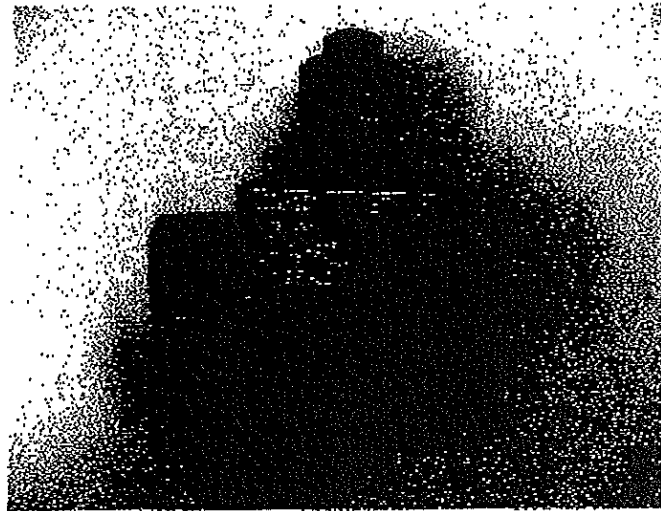
At 1,5 times the maximum torques indicated by the manufacturer, there were no breakdown of the connector or the core conductor.

На основание чл. 2
от ЗЗЛД

ВЪРНЕ С ОПИТАНАТА

SICAME LABORATORY

Test report number 0509330
Annex 1



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ВЪРНЕ С ОРИГИНАЛА





sicame

Laboratoire d'essais
Direction Etudes et Recherches

Test report	: Installation test at low temperature
Test number	: 0209320
Product brand	: SICAME
Product type	: NTD 201AFA

Demander of the test : DER

Starting date of the test : 19/09/2005

Report emission date : 20 SEP, 2005

According to standard : NF C 33-020 (June 98) sub-clause 2.5

This report contains : 3 pages and 1 annex

Conclusion : The tested SICAME LV insulation piercing connectors type NTD 201AFA conform to the requirements of NF C 33-020 (June 98) sub-clause 2.5 standard.

This is an English translation. The original French test report is the only reference version

На основание чл. 2
от ЗЗЛД

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ВАРНО С ОПТИМАЛАТА

"BAK - 02" OOD
САМОКОВ

1 Equipment used during test

1.1 Equipment used

N°UT	Designation	Characteristic
94 02 26	Torque wrench	Range 8 Nm : Accuracy 4%
91 02 44	Low temperature chamber	Accuracy 1°C
03 02 56	Stop watch	Accuracy 1s
92 04 20	Buzzer	9 V

1.2 Cables

	Main core	Main core	Tap core
Section (mm ²)	34,4	75,5	35
Nature	Almelec	Almelec	Aluminium
Requirements	C 34-125	C 34-125	NF C 33-209
From	France	France	France
Identification number	5001	5186	2017
Conditioned	/	/	One hour at 120°C the 11/08/2005

2 Product tested

Designation : NTD201AFA
 Quantity : 4
 Batch number : 05S48220
 Marking : See annex 1
 Identification : 1 and 2 for 34,4 mm² cross-section
 3 and 4 for 75,5 mm² cross-section
 Reception date at the laboratory on the : 19/09/2005

На основание чл. 2
от ЗЗЛД

ВЯРНО С ОРИГИНАЛА

3 Test

Connectors are tested according to NF C 33-020 (June 98) sub-clause 2.5.

3.1 Procedure

Connectors are loosely installed on the main core and on the tap core with stranded conductor corresponding to the smallest and largest cross-sections on the main core and to the largest cross-section on the tap core.

Connectors are placed in an enclosure kept at $(-10 \pm 1-3)^{\circ}\text{C}$.

After 1 h, while still inside the enclosure, connectors are tightened with a torque of 0,7 times the minimum torque indicated by the manufacturer.

3.2 Preparation

Connectors number 1 and 2 are mounted with $34,4 \text{ mm}^2$ cross main section and 35 mm^2 cross tap section.

Connectors number 3 and 4 are mounted with $75,5 \text{ mm}^2$ cross main section and 35 mm^2 cross tap section.

4 Requirement

The indicator shall indicate the closure of the electrical circuit before 0,7 times the minimum torque.

5 Results

	Standard requirements	Results
Low temperature chamber	Between -13 and -9°C	$-11,4^{\circ}\text{C}$
Closure of the electrical circuit torque (Nm)	Minimum torque : $0,7 \times 13 = 9,1$	Connector n°1 : OK Connector n°2 : OK Connector n°3 : OK Connector n°4 : OK

6 Conclusion

The indicator indicates the closure of the electrical circuit before 0,7 times the minimum torque.

На основание чл. 2
от ЗЗЛД

ВЯРНО С ОРИГИНАЛА

**СПИСЪК НА ОТДЕЛНИТЕ ИЗПИТВАНИЯ НА ИЗОЛИРАНА КЛЕМА ТИП
NTD 201 АГА**

1. № на тест: 0500330 - Проверка на електрическата връзка, чупливост на главата и механична якост на клемата;
2. № на тест: 0209320 – Инсталационен тест при ниска температура.

Съставил:

На основание чл. 2
от ЗЗЛД





sicame

Laboratoire d'essais
Direction Etudes et Recherches

Test report	: Checking electrical continuity, shearheads and mechanical behaviour of the connector
Test number	: 0509530
Product brand	: SICAME
Product type	: NTD 151 AFA

Demandeur of the test : Commercial direction

Starting date of the test : 19/09/2005

Report emission date : 20 SEP. 2005

According to standard : NFC 33 020 § 2.3.1 (June 98)

This report contains : 4 pages and 1 annex

Conclusion : The tested SICAME LV insulation piercing connectors type NTD 151 AFA conform to the requirements of NFC 33 020 § 2.3.1 (June 98) standard.

This is an English translation. The original French test report is the only reference version

На основание чл. 2
от ЗЗЛД

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ВЯРНО С ОПРИМАНАТА

"BAK - 02" ООД
D 0330 02
САМОКОВ

500

1 Equipment used during test

1.1 Equipment used

N° U.T.	Designation	Characteristics
94 02 56	Tightening test machine according to annex C of NF C 33-020 standard	Time : Accuracy 0,2 s Torque : Accuracy 4% Strength : Accuracy 4%
88 00 04	Plotter	/
97 02 02	Calibrated ruler	Accuracy 1 mm

1.2. Cables

	Main cable	Main cable	Tap cable
Section (mm ²)	34,4	75,5	35
Nature	Aluminium	Aluminium	Aluminium
Standard	C 34-125	C 34-125	NF C 33-209
From	France	France	France
Identification n°	5001	5186	2017
Conditioned on	/	/	The 11/08/2005 (1h00 at 120°C)

2 Product tested

Designation : NTD 151 AFA
Number : 4
Batch number : 05 S 848220
Marking : See annex 1
Identification : 1 and 2 for 34,4 mm² main cross-section
3 and 4 for 75,5 mm² main cross-section
Reception date at the laboratory : on the 19/09/2005

На основание чл. 2
от ЗЗЛД

ВАРНО С ОБРАЗОВАНИЕ

mg

789

3 Test procedure

Connectors are tested according to NFC 33 020 § 2.3.1 (june 98) standard.

3.1 Procedure

Connectors are loosely installed on the main core and on the tap core with stranded conductor corresponding to the smallest and largest cross-sections on the main core and to the largest cross-section on the tap core. For this purpose, the main cable is stretched, and the tensile strength is indicated in the standard.

Connectors are tightened using the test machine described in the annex C of NFC 33 020 § 2.3.1 (june 98) standard.

Tightening is carried out up to 0,7 times the minimum torque indicated by the manufacturer then up to the breakdown of the shearhead and, lastly, up to 1,5 times the maximum torque indicated by the manufacturer.

For a connector fitted with two screws on the same core, after the breakdown of the shearheads, tightening may be carried out manually and alternatively using torque meter. The tightening conditions shall be as close as possible to those defined for the use of the test machine described in annex C.

3.2 Test

Connectors 1 and 2 are installed with 34,4 mm² main core and 35 mm² tap core. The main core tensile strength shall be between 2,23 kN and 2,79 kN.

Connectors 3 and 4 are installed with 75,5 mm² main core and 35 mm² tap core. The main core tensile strength shall be between 4,91 kN and 6,14 kN.

4 Requirements

At 0,7 times the minimum torque, electrical contact shall have occurred between the cores as per sub-clause 2.2.8 in the same standard.

Maximum shearhead torques measured shall be within the range of the minimum and maximum torques indicated by the manufacturer.

At 1,5 times the maximum torques indicated by the manufacturer, there shall be no breakdown of the connector or the core conductor.

На основание чл. 2
от ЗЗЛД

ВЪРХУ С ОПИТИНАТА

5 Results

	Standard requirements	Results
Ambient temperature and humidity conditions	Between 15 and 35°C Between 25 % and 75 % HR	21 °C 40 % HR
Tensile strength (kN)	For 34,4 mm ² : between 2,23 and 2,79 For 75,5 mm ² : between 4,91 and 6,14	For 34,4 mm ² : 2,7 For 75,5 mm ² : 5,1
Electrical contact torque (N.m)	≤ 0,7 × 13 that is 9,1	Connector 1 : OK Connector 2 : OK Connector 3 : OK Connector 4 : OK
Shearhead breakdown torque (N.m)	F1314 that is between 13 and 16	Connector 1 : OK Connector 2 : OK Connector 3 : OK Connector 4 : OK
Connector breakdown torque (N.m)	≥ 1,5 × 16 that is 24	Connector 1 : OK Connector 2 : OK Connector 3 : OK Connector 4 : OK

6 Conclusion

At 0,7 times the minimum torque, electrical contact have occurred between the cores as per sub-clause 2.2.8 in the same standard.

Maximum shearhead torques measured were within the range of the minimum and maximum torques indicated by the manufacturer.

At 1,5 times the maximum torques indicated by the manufacturer, there were no breakdown of the connector or the core conductor.

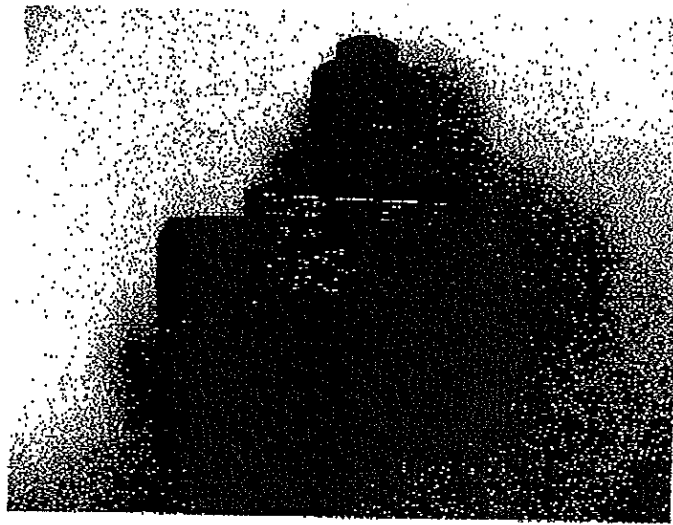
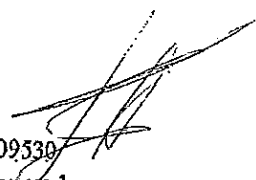
На основание чл. 2
от ЗЗЛД

ВЯРНО С ОРИГИНАЛА

791

SICAME LABORATORY

Test report number 0509530
Annex 1



ВЪРНО С ОПИТИНАТА





sicame

Laboratoire d'essais
Direction Etudes et Recherches

Test report : Installation test at low temperature
Test number : 0509520
Product brand : SICAME
Product type : NTD 151 AFA

Demandeur of the test : DER
Starting date of the test : 19/09/2005
Report emission date : 20 SEP, 2005
According to standard : NF C 33-020 (June 98) sub-clause 2.5
This report contains : 3 pages and 1 annex

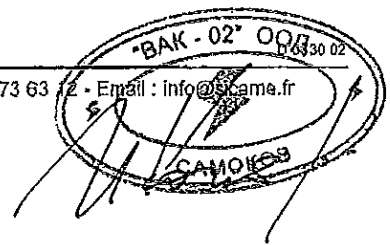
Conclusion : The tested SICAME LV insulation piercing connectors type NTD 151 AFA conform to the requirements of NF C 33-020 (June 98) sub-clause 2.5 standard.

This is an English translation. The original French test report is the only reference version

На основание чл. 2
от ЗЗЛД

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ВАРНО С ОРМОНАТА



793

1 Equipment used during test

1.1 Equipment used

N°UT	Designation	Characteristic
94 02 26	Torque wrench	Range 8 Nm : Accuracy 4%
91 02 44	Low temperature chamber	Accuracy 1°C
03 02 56	Stop watch	Accuracy 1s
92 04 20	Buzzer	9 V

1.2 Cables

	Main core	Main core	Tap core
Section (mm ²)	34,4	75,5	35
Nature	Aluminium	Aluminium	Aluminium
Requirements	C 34-125	C 34-125	NF C 33-209
From	France	France	France
Identification number	5001	5186	2017
Conditioned	/	/	One hour at 120°C the 11/08/2005

2 Product tested

Designation : NTD 151 AFA

Quantity : 4

Batch number : 05S48220

Marking : See annex 1

Identification : 1 and 2 for 34,4 mm² cross-section
3 and 4 for 75,5 mm² cross-section

Reception date at the laboratory on the : 19/09/2005

На основание чл. 2
от ЗЗЛД

ВЯРНО С ОПИТИВАНАТА

3 Test

Connectors are tested according to NF C 33-020 (June 98) sub-clause 2.5 .

3.1 Procedure

Connectors are loosely installed on the main core and on the tap core with stranded conductor corresponding to the smallest and largest cross-sections on the main core and to the largest cross-section on the tap core.

Connectors are placed in an enclosure kept at $(-10 \pm 1-3)^{\circ}\text{C}$.

After 1 h, while still inside the enclosure, connectors are tightened with a torque of 0,7 times the minimum torque indicated by the manufacturer.

3.2 Preparation

Connectors number 1 and 2 are mounted with $34,4 \text{ mm}^2$ cross main section and 35 mm^2 cross tap section.

Connectors number 3 and 4 are mounted with $75,5 \text{ mm}^2$ cross main section and 35 mm^2 cross tap section.

4 Requirement

The indicator shall indicate the closure of the electrical circuit before 0,7 times the minimum torque.

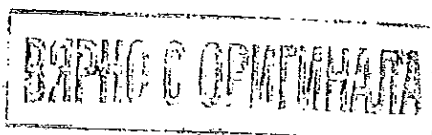
5 Results

	Standard requirements	Results
Low temperature chamber	Between -13 and -9°C	$-11,4^{\circ}\text{C}$
Closure of the electrical circuit torque (Nm)	Minimum torque : $0,7 \times 13 = 9,1$	Connector n°1 : OK Connector n°2 : OK Connector n°3 : OK Connector n°4 : OK

6 Conclusion

The indicator indicates the closure of the electrical circuit before 0,7 times the minimum torque.

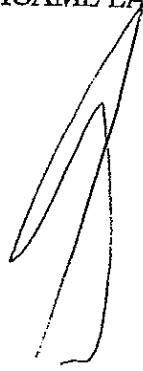
На основании чл. 2
от ЗЗЛД



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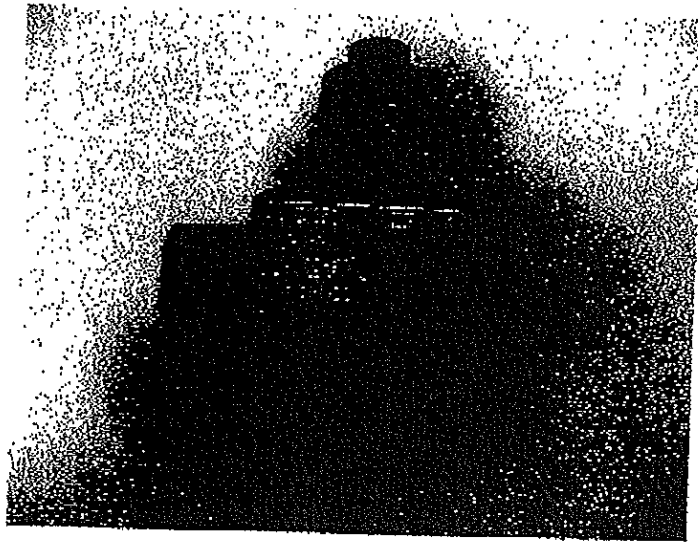
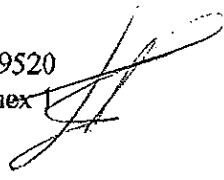
795

SICAME LABORATORY



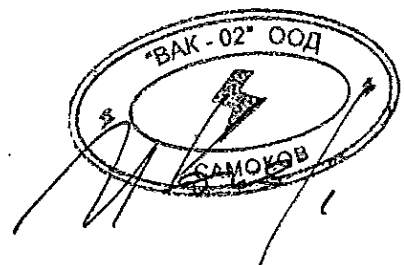
Test report number 0509520

Annex 1



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ВЪРНО С ОРИГИНАЛА



2/11



sicame

Laboratoire d'essais
Direction Etudes et Recherches

Test report	: Checking mechanical strength of tap cores
Test number	: 05 09 550
Product brand	: SICAME
Product type	: NTD 151 AFA

Demandeur of the test : SICAME Export

Starting date of the test : 19/09/2005

Report emission date : 20 SEP. 2005

According to standard : NFC 33 020 § 2.3.3 (June 98)

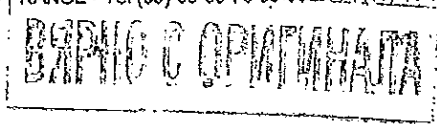
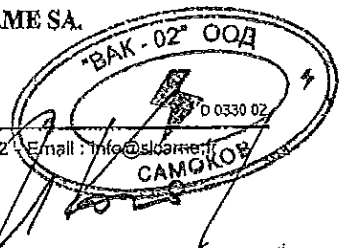
This report contains : 3 pages and 1 annex

Conclusion : The tested SICAME LV insulation piercing connectors type NTD 151 AFA conform to the requirements of NFC 33 020 § 2.3.3 (June 98).

This is an English translation. The original French test report is the only reference version

На основании чл. 2
от 33ЛД

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1 Equipment used during test.**1.1. Equipment used :**

N° U.T.	Designation	Characteristic
98 01 86	Electronic torque wrench ETW25	Range 2,9 to 25 Nm : Accuracy 4%
94 03 10	Traction bench 3 tons	Class 1
01 01 61	Tensor 500 N	Class 1

1.2. Cables :

	Main cable	Tap cable
Section (mm ²)	34,4	6
Nature	Aluminium	Copper
Standard	NF C 34-125	NF C 33-209
From	France	France
Identification n°	5001	9967
Conditioned on	/	11/06/2001 (1h at 120°C)

2 Product tested.

Designation : NTD 151 AFA
 Number : 2
 Batch number : 05M482200
 Marking : See annex 1
 Identification : 1 and 2
 Reception date : at the laboratory on the 19/09/2005.

На основание чл. 2
от ЗЗЛД

ВЯРНО С ОПРАГНАТА

3 Test procedure

Connectors are tested according to NFC 33 020 § 2.3.3 (june 98).

Connectors are loosely installed on the main core and on the tap core with stranded conductor corresponding to the smallest cross-sections on the main core and to the smallest cross-section on the tap core.

Connectors are tightened up to the maximum torque indicated by the manufacturer.

Connectors are held in a fixed position. An increasing tensile strength is applied at a rate between 100 N/min and 500 N/min along the axis of the recess of the core to the tap core conductor up to the value indicated in the standard. This stress is maintained for one minute.

4 Requirements

No breakdown nor slippage of the conductor of the tap core shall occur throughout the application of the tensile strength.

5 Results

	Standard requirements	Results
Ambient temperature and humidity conditions	Between 15 and 35°C Between 25 % and 75 % HR	22°C 42%HR
Torque (Nm)	Maximum torque : 16	Connector 1 : 16,3 Connector 2 : 16,1
Rate of the tensile (N/min)	Between 100 and 500	300
Stress maintained for one min (N)	260 0 +5%	Connector 1 : Ok Connector 2 : Ok

6 Conclusion

No breakdown nor slippage of the conductor of the tap core occurred throughout the application of the tensile strength.

На основании чл. 2
от ЗЗЛД

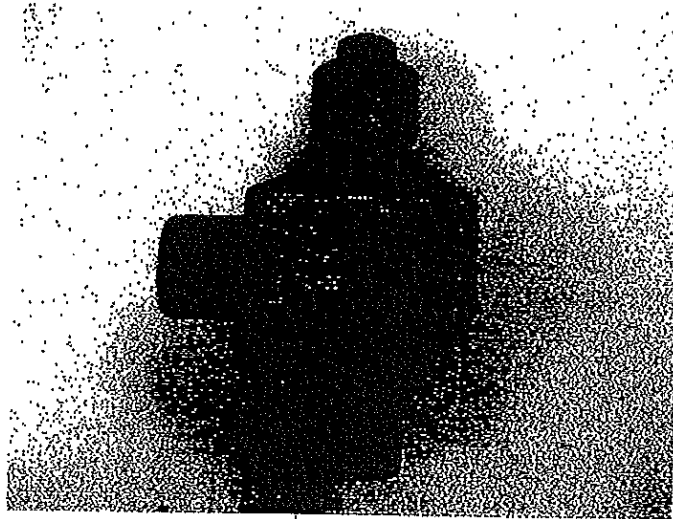
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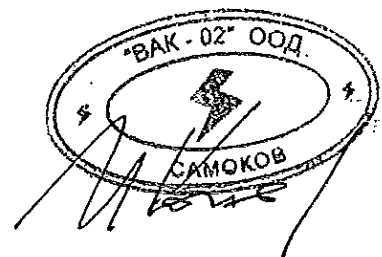
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SICAME LABORATORY

Test report number 0509550
Annex 1



ВЯРНО С ОРМИНАЛАТА



**СПИСЪК НА ОТДЕЛНИТЕ ИЗПИТВАНИЯ НА ИЗОЛИРАНА КЛЕМА
ТИП NTD 151 АГА**

1. № на тест: 0509530 - Проверка на електрическата връзка, чувствителност на главата и механична якост на клемата;
2. № на тест: 0509520 – Тест за инсталиране при ниска температура;
3. № на тест: 0509550 - Контрол на механичната якост на разклонителните жила.

Съставил:

На основание чл. 2
от ЗЗЛД



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sicame

Laboratoire d'essais
Direction Etudes et Recherches

Test report	: Installation test at low temperature
Test number	: 0509320
Product brand	: SICAME
Product type	: NTD 151 FA

Demandeur of the test : DER

Starting date of the test : 19/09/2005

Report emission date : 20 SEP, 2005

According to standard : NF C 33-020 (June 98) sub-clause 2,5

This report contains : 3 pages and 1 annex

Conclusion : The tested SICAME LV insulation piercing connectors type NTD 151.FA conform to the requirements of NF C 33-020, (June 98) sub-clause 2,5 standard.

This is an English translation. The original French test report is the only reference version

На основание чл. 2
от ЗЗЛД

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ВАРНО С ОРБИТАЛНАТА

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1 Equipment used during test

1.1 Equipment used

N°UT	Designation	Characteristic
94 02 26	Torque wrench	Range 8 Nm : Accuracy 4%
91 02 44	Low temperature chamber	Accuracy 1°C
03 02 56	Stop watch	Accuracy 1s
92 04 20	Buzzer	9 V

1.2 Cables

	Main core	Main core	Tap core
Section (mm ²)	34,4	75,5	35
Nature	Copper	Copper	Aluminium
Requirements	C 34-125	C 34-125	NF C 33-209
From	France	France	France
Identification number	5001	5186	2017
Conditioned	/	/	One hour at 120°C the 11/08/2005

2 Product tested

Designation : NTD 151 FA

Quantity : 4

Batch number : 05S48220

Marking : See annex 1

Identification : 1 and 2 for 34,4 mm² cross-section
3 and 4 for 75,5 mm² cross-section

Reception date at the laboratory on the : 19/09/2005

На основание чл. 2
от ЗЗЛД

ВЯРНО С ОРГЕНАЛА

3 Test

Connectors are tested according to NF C 33-020 (June 98) sub-clause 2.5.

3.1 Procedure

Connectors are loosely installed on the main core and on the tap core with stranded conductor corresponding to the smallest and largest cross-sections on the main core and to the largest cross-section on the tap core.

Connectors are placed in an enclosure kept at (-10 +1-3)°C.

After 1 h, while still inside the enclosure, connectors are tightened with a torque of 0,7 times the minimum torque indicated by the manufacturer.

3.2 Preparation

Connectors number 1 and 2 are mounted with 34,4 mm² cross main section and 35 mm² cross tap section.

Connectors number 3 and 4 are mounted with 75,5 mm² cross main section and 35 mm² cross tap section.

4 Requirement

The indicator shall indicate the closure of the electrical circuit before 0,7 times the minimum torque.

5 Results

	Standard requirements	Results
Low temperature chamber	Between -13 and -9°C	-11,4°C
Closure of the electrical circuit torque (Nm)	Minimum torque : $0,7 \times 13 = 9,1$	Connector n°1 : OK Connector n°2 : OK Connector n°3 : OK Connector n°4 : OK

6 Conclusion

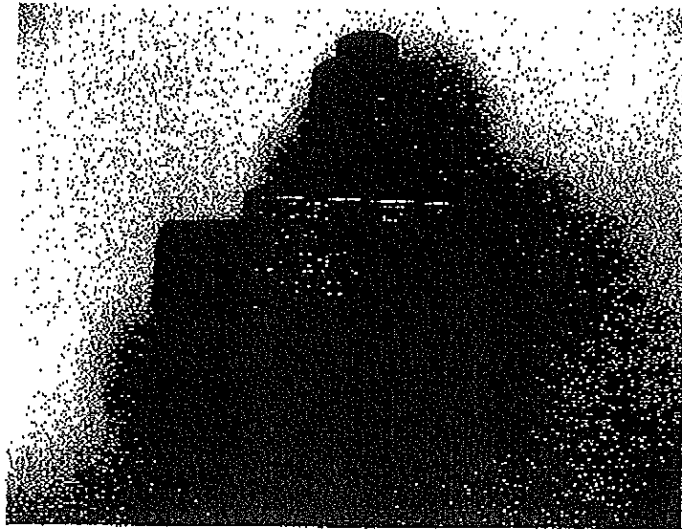
The indicator indicates the closure of the electrical circuit before 0,7 times the minimum torque.

На основание чл. 2
от ЗЗЛД

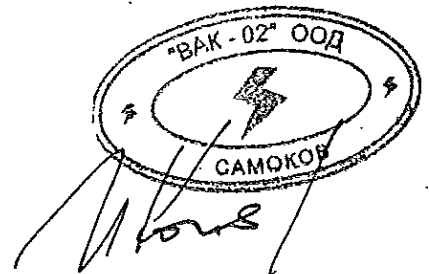
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ВЪРНО С ОПРИМНАТА





sicame

Laboratoire d'essais
Direction Etudes et Recherches

Test report	: Checking mechanical strength of tap cores
Test number	: 05 09 350
Product brand	: SICAME
Product type	: NTD 151 FA

Demandeur of the test : SICAME Export
 Starting date of the test : 19/09/2005
 Report emission date : 20 SEP. 2005
 According to standard : NFC 33 020 § 2.3.3 (June 98)
 This report contains : 3 pages and 1 annex

Conclusion : The tested SICAME LV insulation piercing connectors type NTD 151FA conform to the requirements of NFC 33 020 § 2.3.3 (June 98).

This is an English translation. The original French test report is the only reference version

На основание чл. 2
от ЗЗЛД

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ВАРНО С ОПТИМАЛАТА

DAI

1 Equipment used during test.

1.1. Equipment used :

N° U.T.	Designation	Characteristic
98 01 86	Electronic torque wrench ETW25	Range 2,9 to 25 Nm : Accuracy 4%
94 03 10	Traction bench 3 tons	Class 1
01 01 61	Tensor 500 N	Class 1

1.2. Cables :

	Main cable	Tap cable
Section (mm ²)	34,4	6
Nature	Copper	Copper
Standard	NF C 34-125	NF C 33-209
From	France	France
Identification n°	5001	9967
Conditioned on	/	11/06/2001 (1h at 120°C)

2 Product tested.

Designation : NTD 151 FA
 Number : 2
 Batch number : 05M482200
 Marking : See annex 1
 Identification : 1 and 2
 Reception date : at the laboratory on the 19/09/2005.

На основание чл. 2
от ЗЗЛД

ВЪРНО С ОБМЕННАТА

3 Test procedure

Connectors are tested according to NFC 33 020 § 2.3.3 (june 98).

Connectors are loosely installed on the main core and on the tap core with stranded conductor corresponding to the smallest cross-sections on the main core and to the smallest cross-section on the tap core.

Connectors are tightened up to the maximum torque indicated by the manufacturer.

Connectors are held in a fixed position. An increasing tensile strength is applied at a rate between 100 N/min and 500 N/min along the axis of the recess of the core to the tap core conductor up to the value indicated in the standard. This stress is maintained for one minute.

4 Requirements

No breakdown nor slippage of the conductor of the tap core shall occur throughout the application of the tensile strength.

5 Results

	Standard requirements	Results
Ambient temperature and humidity conditions	Between 15 and 35°C Between 25 % and 75 % HR	22°C 42%HR
Torque (Nm)	Maximum torque : 16	Connector 1 : 16,3 Connector 2 : 16,1
Rate of the tensile (N/min)	Between 100 and 500	300
Stress maintained for one min (N)	260 0 +5%	Connector 1 : Ok Connector 2 : Ok

6 Conclusion

No breakdown nor slippage of the conductor of the tap core occurred throughout the application of the tensile strength.

На основание чл. 2
от ЗЗЛД

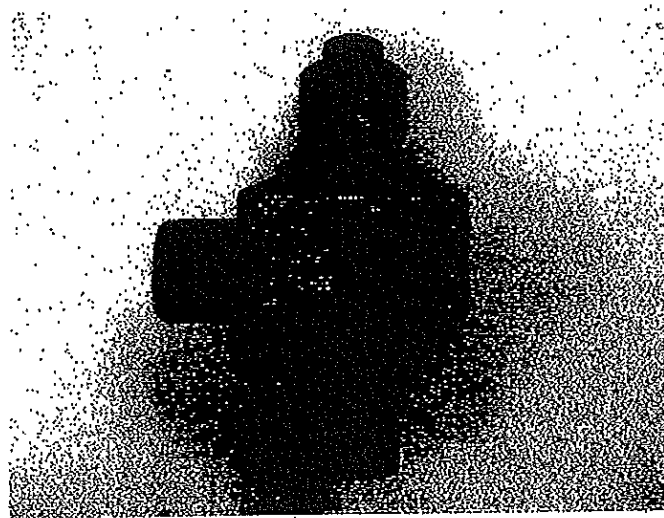
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SICAME LABORATORY

Test report number 0509350
Annex 1



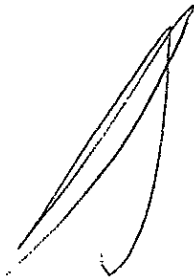
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sicame

Laboratoire d'essais
Direction Etudes et Recherches



Test report	: Checking electrical continuity, shearheads and mechanical behaviour of the connector
Test number	: 0509330
Product brand	: SICAME
Product type	: NTD 151 FA

Demander of the test : Commercial direction
 Starting date of the test : 19/09/2005
 Report emission date : 20 SEP, 2005
 According to standard : NFC 33 020 § 2.3.1 (June 98)
 This report contains : 4 pages and 1 annex

Conclusion : The tested SICAME LV insulation piercing connectors type NTD 151.FA conform to the requirements of NFC 33 020 § 2.3.1 (June 98) standard.

This is an English translation. The original French test report is the only reference version

На основание чл. 2
от ЗЗЛД

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ВАРПИС С ОПИМАНАТА

110

1 Equipment used during test

1.1 Equipment used

N° U.T.	Designation	Characteristics
94 02 56	Tightening test machine according to annex C of NF C 33-020 standard	Time : Accuracy 0,2 s Torque : Accuracy 4% Strength : Accuracy 4%
88 00 04	Plotter	/
97 02 02	Calibrated ruler	Accuracy 1 mm

1.2. Cables

	Main cable	Main cable	Tap cable
Section (mm ²)	34,4	75,5	35
Nature	Copper	Copper	Aluminium
Standard	C 34-125	C 34-125	NF C 33-209
From	France	France	France
Identification n°	5001	5186	2017
Conditioned on	/	/	The 11/08/2005 (1h00 at 120°C)

2 Product tested

Designation : NTD 151 FA
 Number : 4
 Batch number : 05 S 848220
 Marking : See annex 1
 Identification : 1 and 2 for 34,4 mm² main cross-section
 3 and 4 for 75,5 mm² main cross-section
 Reception date at the laboratory : on the 19/09/2005

ВЪРЖО С ОПТИМАЛАТА

На основание чл. 2
от ЗЗЛД

21/1

3 Test procedure

Connectors are tested according to NFC 33 020 § 2.3.1 (june 98) standard.

3.1 Procedure

Connectors are loosely installed on the main core and on the tap core with stranded conductor corresponding to the smallest and largest cross-sections on the main core and to the largest cross-section on the tap core. For this purpose, the main cable is stretched, and the tensile strength is indicated in the standard.

Connectors are tightened using the test machine described in the annex C of NFC 33 020 § 2.3.1 (june 98) standard.

Tightening is carried out up to 0,7 times the minimum torque indicated by the manufacturer then up to the breakdown of the shearhead and, lastly, up to 1,5 times the maximum torque indicated by the manufacturer.

For a connector fitted with two screws on the same core, after the breakdown of the shearheads, tightening may be carried out manually and alternatively using torque meter. The tightening conditions shall be as close as possible to those defined for the use of the test machine described in annex C.

3.2 Test

Connectors 1 and 2 are installed with 34,4 mm² main core and 35 mm² tap core. The main core tensile strength shall be between 2,23 kN and 2,79 kN.

Connectors 3 and 4 are installed with 75,5 mm² main core and 35 mm² tap core. The main core tensile strength shall be between 4,91 kN and 6,14 kN.

4 Requirements

At 0,7 times the minimum torque, electrical contact shall have occurred between the cores as per sub-clause 2.2.8 in the same standard.

Maximum shearhead torques measured shall be within the range of the minimum and maximum torques indicated by the manufacturer.

At 1,5 times the maximum torques indicated by the manufacturer, there shall be no breakdown of the connector or the core conductor.

ВЪРНО С ОПИТНАТА

На основание чл. 2
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5 Results

	Standard requirements	Results
Ambient temperature and humidity conditions	Between 15 and 35°C Between 25 % and 75 % HR	21 °C 40 % HR
Tensile strength (kN)	For 34,4 mm ² : between 2,23 and 2,79 For 75,5 mm ² : between 4,91 and 6,14	For 34,4 mm ² : 2,7 For 75,5 mm ² : 5,1
Electrical contact torque (N.m)	≤ 0,7 × 13 that is 9,1	Connector 1 : OK Connector 2 : OK Connector 3 : OK Connector 4 : OK
Shearhead breakdown torque (N.m)	F1314 that is between 13 and 16	Connector 1 : OK Connector 2 : OK Connector 3 : OK Connector 4 : OK
Connector breakdown torque (N.m)	≥ 1,5 × 16 that is 24	Connector 1 : OK Connector 2 : OK Connector 3 : OK Connector 4 : OK

6 Conclusion

At 0,7 times the minimum torque, electrical contact have occurred between the cores as per sub-clause 2.2.8 in the same standard.

Maximum shearhead torques measured were within the range of the minimum and maximum torques indicated by the manufacturer.

At 1,5 times the maximum torques indicated by the manufacturer, there were no breakdown of the connector or the core conductor.

На основание чл. 2
от ЗЗЛД

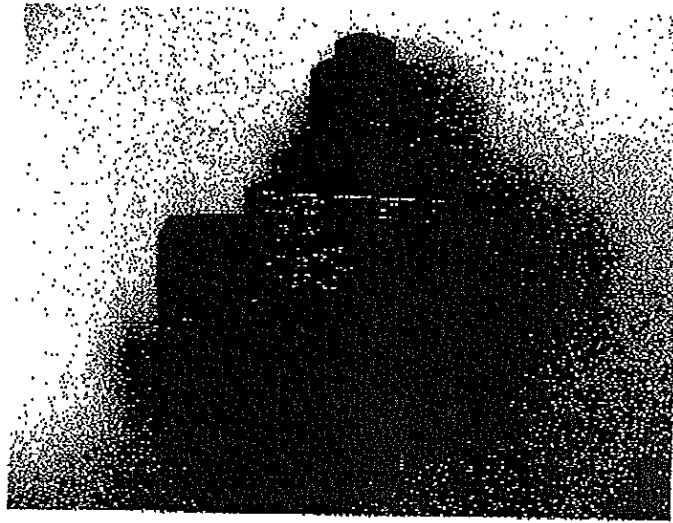
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SICAME LABORATORY

Test report number 0509330
Annex 1



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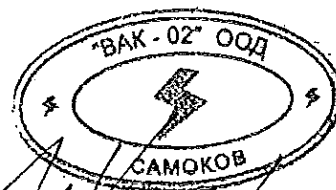
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**СПИСЪК НА ОТДЕЛНИТЕ ИЗПИТВАНИЯ НА ИЗОЛИРАНА КЛЕМА
ТИП NTD 151 FA**

1. № на тест: 0509320 – Тест за инсталиране при ниска температура;
2. № на тест: 0500330 - Проверка на електрическата връзка, чувливост на главата и механична якост на клемата;
3. № на тест: 0509350 – Контрол на механичната якост на разклонителните жила.

Съставил:

На основание чл. 2
от ЗЗЛД



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Laboratoire d'essais
Direction études et recherches

TEST REPORT : DIELECTRIC WATERTIGHT TEST

PRODUCT: Low voltage insulating piercing connectors
(Connectors are used for temporary power
take off or a short circuiting)

Report number	: 9306188
Product brand	: SICAME
Product type	: TTD 1 CCA
Project n°	: E 0680120
Production lot number	: 93S5731

Demandeur of the test: DER SICAME
Starting date of the test : 11/06/1993
Report emission date : 27/03/1997
According to standard : C 33-020 (DECEMBER 92)
This report contains : 3 Pages - Annexe(s)

Conclusion : The low voltage insulation piercing
connectors by SICAME type TTDICCA conforms
to the standard C 33-020 December 92.

На основании чл. 2
от 33ЛД

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SICAME DER	DIELECTRIC TEST EQUIPMENT ACCORDING TO SPECIFICATION: NF C 33-020	SUP ER 1160 INDICE A
---------------	--	-------------------------

Test number : 9306188
 Product brand : SICAME
 Product type : TTDICCA

A - Computer equipment

IBM PS2 (Inv N°: 88-93-06) Hard disk 115 MB
 Analog/Digital interface card
 Digital/Analog interface card
 Disk Operating System: DOS 6.1 IBM
 IBM 4029 020 (Inv N°: 92-03-30) Laser printer

B - Equipment for Dielectric test

Dielectric unit (Inv N°: 91-02-82)

C - General Equipment

Digital vernier (Inv N°: 93-06-07) MITUTOYO
 Electronic Torque wrench (Inv N°: 92-03-31) POWELL DUFFRYN
 Accuracy 1%
 Calibrated Ruler (Inv N°: 95-01-75) ROCH
 Stopwatch (Inv N°: 92-02-82) HANHART

На основании чл. 2
от 33ЛД

СЕРТИФИКАТ

SICAME DER	DIELECTRIC AND WATERTIGHT TEST ACCORDING TO SPECIFICATION : NF C 33-020	SUP ER 560 INDICE A
---------------	--	------------------------

Test number : 9306188 Date: 11/06/1993 Ambient Temperature : 23.2 °C
 Product brand : SICAME Humidity : 48 %
 Product type : TTDICCA Fitted with Shear Heads : F1314

A- Test Procedure

The conductors are bend to the correct shape prior to fitting the connectors. The bolt of the connector is tightened to the minimum torque value as specified by the manufacturer.

The assembly is placed in a container of water, the water level must be 30 cm above the uppermost part of the connector. After the assembly has been immersed for 30 minutes, the assembly is subject to the dielectric test. The potential difference applied between the water and the conductor being 6 kV - 50 Hz, for the duration of 1 minute.

The potential difference is applied at a rate of 1 kV/s. The maximum leakage current for the interruption (triggering of circuit breaker) of the HT supply is 10 mA.

B- Readings

CONNECTOR N°	Cable sizes used (mm²)		Torque Values (Nm)		
	Main	Tap	Main	Tap 1	Tap 2
1	54.6 Alu	PIN	13	-	-
2	54.6 Alu	PIN	13	-	-
3	150 Alu	PIN	13	-	-
4	150 Alu	PIN	13	-	-
N° CONNECTEUR	6kV/1mn After 30 min in water	Tripping value with I=10mA (KV)	OBSERVATIONS		
1	OK	>10	CONFORM		
2	OK	>10	CONFORM		
3	OK	>10	CONFORM		
4	OK	>10	CONFORM		

General comment:

На основании чл. 2
от 33ЛД

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Laboratoire d'essais
 Direction études et recherches

TEST REPORT : Temperature rise and overcurrent test according

PRODUCT: Low voltage insulating piercing connectors
 (Connectors are used for temporary power
 take off or a short circuiting)

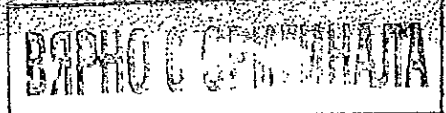
Report number	: 9306177
Product brand	: SICAME
Product type	: TTDICCA
Project n°	: E 0680120
Production lot number	: 93S5731

Demander of the test: DER SICAME
 Starting date of the test : 11/06/1993
 Report emission date : 27/03/1997
 According to standard : C 33-020 (DECEMBER 92)
 This report contains : 3 Pages - Annexe(s)

Conclusion : The low voltage insulation piercing
 connectors by SICAME type TTDICCA conforms
 to the standard C 33-020 December 92

На основании чл. 2
 от 33ЛД

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SICAME DER	EQUIPEMENT USED DURING RISE AND OVERCURRENT TEST ACCORDING STANDARD : C 33-020	SUP ER 1130 INDEX A
---------------	--	------------------------

Test number : 9306177
 Product brand : SICAME
 Product type : TTDICCA

A - Computer

IBM PS2 N°UT : 88 93 06 Hard disc 115 MEGABYTES
 Analogical / digital card
 Digital / Analogical card
 DOS 6.1 IBM System used
 IBM 4029 020 N°UT : 92 03 30 laser printer

B - Electrical ageing machines

N°1 N°UT : 86 01 38

Transformer 1200A/7V or 1200A/10V thyristor units used for the primary transformers. Thermal regulation by eurotherm. 0.5 % indicator accuracy of the full scale at the point of prescription. Program planner cycles : 1 second. Minimum accuracy : 1 min programming. Stabilised continuous current source - SAEME - 0 to 30 Amps measured by shunt 3.3 Megohms. Current adaptor except n° 3

C - Electrical and thermal measurements machines

Scanner N°2 N°UT : 91 03 31

Temperature scanners - COLE PARMER -
 - 12 tracks. Constant copper thermocouples (type T). Scale used : - 200 to + 300 ° C, 1 ° C accuracy.

Numexic calibrator N°UT : 88 05 14 AOIP JN 5303B (tension drop)

Buzzer SICAME N°UT : 92 04 20

Short-circuit machine N°UT : 79 00 59 MEROT SODEX
 Intensity transformer report : 25000/5 A
 Precision rating : 15 VA Class 0.5
 Secondary monophasic transformer : 40 V / 20000 A RMS during 1 s.

D - Other materials

Digital slide caliper ruler N°UT : 93 06 07 MITUTOYO

Electronic torque wrench N°UT : 92 03 31 POWELL DUFFRYN
 Accuracy 1%

На основание чл. 2
 от ЗЗЛД

ВЯРНО С ОПИТИНАТА

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SICAME R & D DEPT	TEMPERATURE RISE AND OVERCURRENT TEST ACCORDING TO STANDARD : C 83-020	SUP ER 760 INDICE A
----------------------	---	------------------------

Test number : 9306177 Date: 11/06/1993 Ambient temperature : 23.4 °C
 Product Brand : SICAME Humidity : 47 %
 Product type : TTDICCA Mounted with shearhead : F1314

A - TESTING METHOD

Four connectors are mounted on phase cables of maximum core area. They are tightened at the minimum torque value indicated by the manufacturer. The connectors are linked together two by two by a 25 mm² copper braid with, at one end, a junction socket compatible with the connector pin. Each connector has a thermocouple at the closest place to the current way inside the connector. Each connector's pin has a thermocouple placed at the bayonet lock.

PRELIMINARY TEMPERATURE RISE :

An AC current of 100 ± 2 A is applied till all components of the test loop have reached a stable temperature. Temperature of each junction is checked and noted as T1; temperature of each pin is checked and noted as T2.

OVERCURRENT TEST :

As soon as the temperature of the test loop is down to ambient temperature, a serial of four overcurrent loads of 4 KA RMS is applied during one second.

FINAL TEMPERATURE RISE :

After these overcurrent loads, an AC current of 100 ± 2 A is applied to the loop till all components of the loop have reached a stable temperature. Temperature of each junction is checked and noted as T3; temperature of each pin is checked and noted as T4.

B - RESULTS

	JUNCTION 1		JUNCTION 2		JUNCTION 3		JUNCTION 4	
	TTD	Pin	TTD	Pin	TTD	Pin	TTD	Pin
Temp. of preliminary heat	T1 44.4	T2 68.1	T1 44.7	T2 70.3	T1 42.8	T2 72.7	T1 42.7	T2 68.1
4 overcurrent loads 4 KA/1s	1. C.C. ----> 3449 A/1.06s 2. C.C. ----> 4226 A/1.08s 3. C.C. ----> 4287 A/1.04s 4. C.C. ----> 4251 A/1.04s							
temp. of final heating	T3 45.3	T4 73.1	T3 45.8	T4 75.6	T3 43.8	T4 75.6	T3 44.2	T4 72.9
Requirements T3-T1 < 10 °C T4-T2 < 10 °C	0.9	5.0	1.1	6.3	1.0	2.9	1.5	4.8

На основание чл. 2 от ЗЗЛД

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**СПИСЪК НА ОТДЕЛНИТЕ ИЗПИТВАНИЯ НА ИЗОЛИРАНА КЛЕМА ЗА
ПРЕНОСИМ ЗАЗЕМИТЕЛ ТИП TTD 1 CCA**

1. № на тест: 9306188 - Диелектричен тест за водонепропускливост;
2. № на тест: 9306177 – Тест за пренапрежение и късо съединение и изпитване при повишена температура.

На основание чл. 2
от ЗЗЛД

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Laboratoire d'essais
LABEP

SICAME GROUP



Rapport d'essai
Test report

: Essai de serrage des boulons du raccord
: Bolt tightening test

Rapport d'essai n°	: 11 12 200	Test report n.	: 11 12 200
Constructeur	: SICAME	Product brand	: SICAME
Référence produit	: TTD2CCA	Product type	: TTD2CCA
Demandeur de l'essai	: SICAME S.A.	Demander of the test	: SICAME S.A.
Date d'essai	: 31 janvier 2012	Date of the test	: 31 January 2012
Date d'émission du rapport	: 07 février 2012	Report emission date	: 07 February 2012

Essais réalisés suivant : NF EN 50483-4 (07/2009), § 8.1.2.3
Tests carried out in accordance with

Ce rapport comprend : 6 pages
This report contains

Conclusion : Les connecteurs à perforation d'isolant SICAME de type TTD2CCA soumis à essai satisfont aux exigences du § 8.1.2.3 de la norme NF EN 50483-4 (07/2009).
Pour déclarer la conformité, il n'a pas été tenu explicitement compte de l'incertitude associée au résultat.

Conclusion : The tested SICAME insulation piercing connectors TTD2CCA comply with the requirements of clause 8.1.2.3 of NF EN 50483-4 (July 2009) standard.
To give a ruling on the conformity, the uncertainty associated to the result is not implicitly involved

На основании чл. 2
от 33ЛД

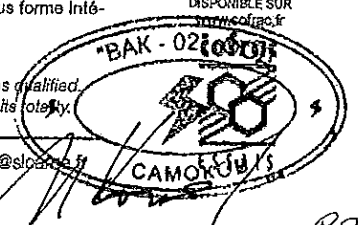
L'accréditation de la section essais du COFRAC atteste de la compétence des laboratoires pour les seuls essais couverts par l'accréditation. Ce rapport ne concerne que les produits référencés ci-dessus. La reproduction de ce rapport d'essais n'est autorisée que sous forme intégrale, avec l'accord de SICAME S.A.

ACCREDITATION
N° 1-1068
PORTÉE
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Accreditation 1-1068. Scope on request.
The COFRAC testing section accreditation ensures the competence of the Laboratory staff for the tests for which the laboratory has qualified.
This report applies only to the products as listed above. With the authorization of Sicame S.A., this report may only be reproduced in its totality.

B.P. N° 1 - 19231 POMPADOUR - CEDEX - FRANCE - Tél : 33 (0)5 55 73 69 00 - Fax : 33 (0)5 55 73 63 12 - Email : Info@sicame.fr



1 Echantillons soumis à essai / Samples under test

Type : Connecteur à perforation d'isolant (raccord temporaire)
Insulation piercing connector (temporary connector)

Désignation / Designation : TTD2CCA

Fabricant / Manufacturer : SICAME

Numéro de lot / Batch number : 11M307140
Echantillons conformes au plan E0680165
Samples compliant with drawing n. E0680165

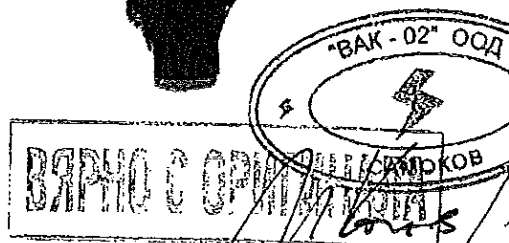
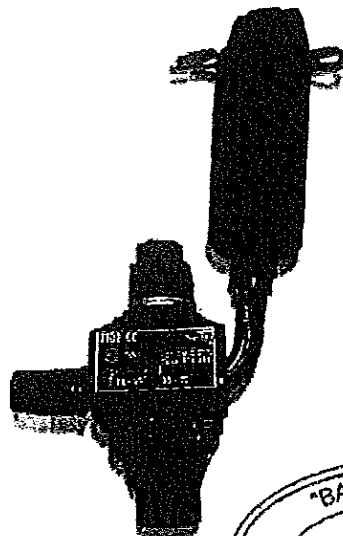
Couples de serrage <i>Tightening torques</i>	
Minimal	13 Nm
Nominal	14 Nm
Maximal	16 Nm

Plage de sections <i>Cross-section range</i>		
	Principal <i>Main</i>	Dérivé <i>Tap</i>
Min	16 mm ²	Satellite
Max	95 mm ²	

Classes du produit selon NF EN 50483-1 (§9.3) <i>Classes of product in accordance with NF EN 50483-1 (§9.3)</i>	
<input type="checkbox"/> Classe A <i>Class A</i>	: raccords soumis aux cycles de vieillissement électrique et aux essais de court-circuit <i>: connectors subjected to electrical ageing cycles and short-circuits</i>
<input type="checkbox"/> Classe B <i>Class B</i>	: raccords soumis seulement aux cycles de vieillissement électrique <i>: connectors subjected only to electrical ageing cycles</i>
<input checked="" type="checkbox"/> Classe 1 <i>Class 1</i>	: raccords soumis à l'essai de tenue diélectrique dans l'eau <i>: connectors subjected to a.c. voltage withstand test in water</i>
<input type="checkbox"/> Classe 2 <i>Class 2</i>	: raccords soumis à l'essai de tenue diélectrique dans l'air <i>: connectors subjected to a.c. voltage withstand test in air</i>

Nombre d'échantillons / Number of samples : 4
Repérage / Identification : 1, 2, 3, 4

Date de réception au laboratoire : 14 décembre 2011
Reception date at the laboratory : 14 December 2011



На основание чл. 2
от ЗЗЛД

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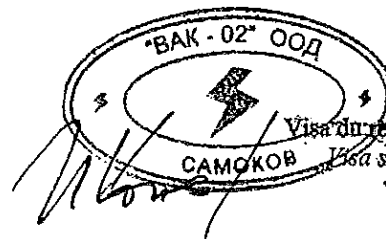
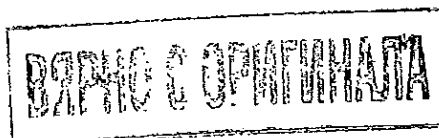
2 Caractéristiques du matériel / Equipment used during test

2.1 Appareillage utilisé / Equipment used

N° U.T.	Désignation / Designation	Caractéristique / Characteristic
10 00 27	Clé à couple électronique <i>Electronic torque wrench</i>	De 1,5 à 30 Nm : Précision 4% <i>Range 1,5 to 30 Nm ; Accuracy 4%</i>
02 01 76	Thermomètre indicateur <i>Indicating thermometer</i>	Précision $\pm 2^\circ\text{C}$ <i>Accuracy $\pm 2^\circ\text{C}$</i>
94 03 10	Banc de traction 3 tonnes <i>Traction bench 3 tons</i>	Classe 1 <i>Class 1</i>
97 02 02	Réglet étalon <i>Calibrated ruler</i>	Précision 0,5 mm <i>Accuracy 0,5 mm</i>

2.2 Câbles / Cables

N° Lot / Identification	07045		
Fourni par / Supplied by	<input checked="" type="checkbox"/> Laboratoire <i>Laboratory</i>	<input type="checkbox"/> Demandeur <i>Applicant</i>	
Norme / Standard	NF C 33-209		
Provenance / From	France		
Section / Cross section	16 mm ²		
Matériau de l'âme / Conductor material	<input type="checkbox"/> Cuivre <i>Copper</i>	<input checked="" type="checkbox"/> Aluminium	<input type="checkbox"/> Alliage d'aluminium <i>Aluminium alloy</i>
Type d'âme / Conductor type	<input type="checkbox"/> Massive <i>Solid</i>	<input checked="" type="checkbox"/> Câblée <i>Stranded</i>	<input type="checkbox"/> Rétreinte <i>Compacted</i>
	<input type="checkbox"/> Rétreinte <i>Compacted</i>	<input checked="" type="checkbox"/> Non rétreinte <i>Non compacted</i>	<input type="checkbox"/> Souple <i>Flexible</i>
Forme d'âme / Conductor shape	<input checked="" type="checkbox"/> Ronde <i>Circular</i>	<input type="checkbox"/> Sectorale <i>Sector-shaped</i>	
Nombre de brins / Number of wires	7		
Ø sur âme / Ø on conductor	4,85 mm		
Matériau de l'isolant Insulation material	Polyéthylène réticulé type TIX-5 <i>Cross-linked polyethylene, TIX-5 type</i>		
Ø sur isolant / Ø on insulation	7,4 mm		
Conditionnement Conditioned on	1 heure à 120°C <i>1 hour at 120°C</i>		
Charge de rupture minimale (CRM) / Minimum Breaking Load (MBL)	1900 N		
Référence du câble HD626 / HD626 conductor reference	4 E-1		



Visa du responsable de l'essai
Visa supervisor of the test

N° Lot / Identification	05024		
Fourni par / Supplied by	<input type="checkbox"/> Laboratoire Laboratory	<input checked="" type="checkbox"/> Demandeur Applicant	
Norme / Standard	UNE 21-030-92		
Provenance / From	Espagne		
Section / Cross section	95 mm ²		
Matériau de l'âme / Conductor material	<input type="checkbox"/> Cuivre Copper	<input checked="" type="checkbox"/> Aluminium	<input type="checkbox"/> Alliage d'aluminium Aluminium alloy
Type d'âme / Conductor type	<input type="checkbox"/> Massive Solid	<input checked="" type="checkbox"/> Câblée Stranded	
	<input checked="" type="checkbox"/> Rétreinte Compacted	<input type="checkbox"/> Non rétreinte Non compacted	<input type="checkbox"/> Souple Flexible
Forme d'âme / Conductor shape	<input checked="" type="checkbox"/> Ronde Circular	<input type="checkbox"/> Sectorale Sector-shaped	
Nb de brins / N. of wires	15		
Ø sur âme / Ø conductor	11,5 mm		
Matériau de l'isolant Insulation material	Polyéthylène réticulé type TIX-3 Cross-linked polyethylene, TIX-3 type		
Ø sur isolant / Ø insulation	15,3 mm		
Conditionnement Conditioned on	1 heure à 120°C 1 hour at 120°C		
Charge de rupture minimale (CRM) / Minimum Breaking Load (MBL)	11400 N		
Référence du câble HD626 / HD626 conductor reference	6K-1		

ВЕРНО С ОПИШАНІАТА



Visa du responsable de l'essai
Visa supervisor of the test

3 Méthode / Method

Les essais sur les connecteurs sont effectués selon les prescriptions du paragraphe 8.1.2.3 de la norme NF EN 50483-4 (07/2009).

L'essai est effectué sur deux raccords pour chaque section.

Le conducteur sur lequel le connecteur à perforation d'isolant doit être monté est tendu à 20 % de sa CRM.

Les raccords doivent être serrés, conformément à la NF EN 50483-1 § 9.1.10, au couple maximal spécifié par le fournisseur, plus 20 %.

Connectors are tested in accordance with NF EN 50483-4 § 8.1.2.3 (07/2009) standard.

The test is carried out on two connectors for each cross-section.

The core on to which the IPC is to be installed is tensioned to 20 % of its MBL (Minimum Breaking Load).

The connectors are tightened, in accordance with NF EN 50483-1 § 9.1.10, to the maximum torque specified by the manufacturer, plus 20 %.

3.1 Conditions ambiantes / Ambient conditions

Les conditions ambiantes relevées lors de l'essai sont les suivantes :

Ambient conditions when performing the test are as follows :

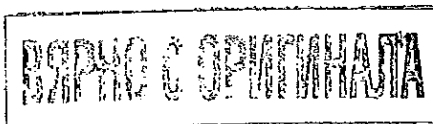
	Exigences <i>Requirements</i>	Relevés <i>Results</i>
Température ambiante et humidité <i>Ambient temperature and humidity conditions</i>	15 °C ≤ T° ≤ 30 °C 25 % ≤ HR ≤ 75 %	21 °C 35 %HR

3.2 Configuration des échantillons / Samples configuration

Echantillon n° <i>Sample n.</i>	Section/ Cross section (mm ²)	
	Câble principal <i>Main cable</i>	Câble dérivé <i>Tap cable</i>
1	95	Satellite
2		
3	16	Satellite
4		

3.3 Relevés des couples de serrage / Tightening torque values

Echantillon n° <i>Sample n.</i>	Couples de serrage du connecteur (Nm) <i>Connector tightening torques</i>
1	19,50
2	19,64
3	19,22
4	19,27



Visa du responsable de l'essai
Visa supplier of the test

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4 Exigences / Requirements

Echantillon n° Sample n.	Effort pendant le serrage Strength during tightening (N)	Exigences Requirements (N)
1	2280	20 % CRM 20% MBL
2	2280	
3	380	
4	380	

5 Conclusion / Conclusion

Le connecteur n'est pas endommagé.

The connector is undamaged.

FIN DU RAPPORT D'ESSAI / END OF TEST REPORT

ВАРНО С ОПРИМНАТА



Visa du responsable de l'essai
Visa supervisor of the test

Mue

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Laboratoire d'essais
LABEP

SICAME GROUP



Rapport d'essai
Test report

: Essai de résistance mécanique du conducteur principal
: Test for mechanical damage to the main conductor

Rapport d'essai n°	: 11 12 190	Test report n.	: 11 12 190
Constructeur	: SICAME	Product brand	: SICAME
Référence produit	: TTD2CCA	Product type	: TTD2CCA
Demandeur de l'essai	: SICAME S.A.	Test applied by	: SICAME S.A.
Date d'essai	: 31 Janvier 2012	Date of the test	: 31 January 2012
Date d'émission du rapport	: 06 février 2012	Report emission date	: 06 February 2012

Essais réalisés suivant : NF EN 50483-4 (07/2009), § 8.1.2.1
Tests carried out in accordance with

Ce rapport comprend : 7 pages
This report contains

Conclusion : Les connecteurs à perforation d'isolant BT SICAME de type TTD2CCA soumis à essai satisfait aux exigences du § 8.1.2.1 de la norme NF EN 50483-4 (07/2009).
Pour déclarer la conformité, il n'a pas été tenu explicitement compte de l'incertitude associée au résultat.

Conclusion : The tested SICAME LV insulation piercing connectors TTD2CCA comply with the requirements of clause 8.1.2.1 of NF EN 50483-4 (July 2009) standard.
To give a ruling on the conformity, the uncertainty associated to the result is not implicitly involved

На основании чл. 2
от 33ЛД

L'accréditation de la section essais du COFRAC atteste de la compétence des laboratoires pour les seuls essais couverts par l'accréditation. Ce rapport ne concerne que les produits référencés ci-dessus. La reproduction de ce rapport d'essais n'est autorisée que sous forme intégrale, avec l'accord de SICAME S.A.

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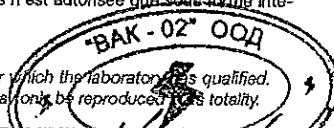


Accreditation 1-1068. Scope on request.

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1 Echantillons soumis à essai / Samples under test

Type : Connecteur à perforation d'isolant (raccord temporaire)
Insulation piercing connector (temporary connector)

Désignation / Designation : TTD2CCA

Fabricant / Manufacturer : SICAME

Numéro de lot / Batch number : 11M307140
Echantillons conformes au plan E0680165
Samples compliant with drawing n. E0680165

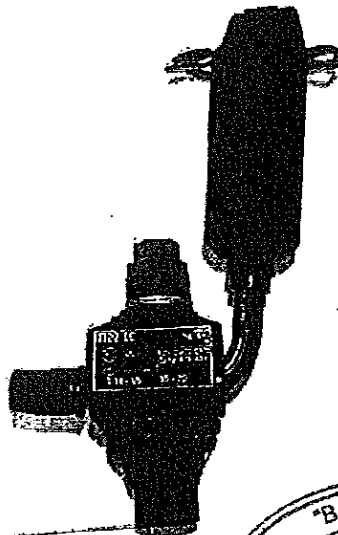
Couples de serrage Tightening torques	
Minimal	13 Nm
Nominal	14 Nm
Maximal	16 Nm

Plage de sections Cross-section range		
	Principal Main	Dérivé Tap
Min	16 mm ²	Satellite
Max	95 mm ²	

Classes du produit selon NF EN 50483-1 (§9.3) Classes of product in accordance with NF EN 50483-1 (§9.3)	
<input type="checkbox"/>	Classe A : raccords soumis aux cycles de vieillissement électrique et aux essais de court-circuit Class A : connectors subjected to electrical ageing cycles and short-circuits
<input type="checkbox"/>	Classe B : raccords soumis seulement aux cycles de vieillissement électrique Class B : connectors subjected only to electrical ageing cycles
<input checked="" type="checkbox"/>	Classe 1 : raccords soumis à l'essai de tenue diélectrique dans l'eau Class 1 : connectors subjected to a.c. voltage withstand test in water
<input type="checkbox"/>	Classe 2 : raccords soumis à l'essai de tenue diélectrique dans l'air Class 2 : connectors subjected to a.c. voltage withstand test in air

Nombre d'échantillons / Number of samples : 4
Repérage / Identification : 1, 2, 3, 4

Date de réception au laboratoire : 14 décembre 2011
Reception date at the laboratory : 14 December 2011



ВАЖНО С ОПРИГНАЛАТА



Visa du responsable de l'essai
Visa supervisor of the test

830

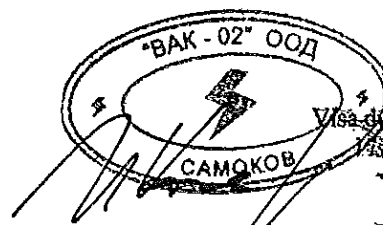
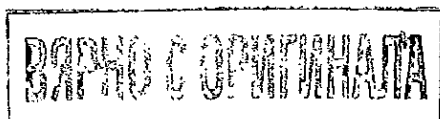
2/ **Caractéristiques du matériel / Equipment used during test**

2.1 **Appareillage utilisé / Equipment used**

N° U.T.	Désignation / Designation	Caractéristique / Characteristic
10 00 27	Clé à couple électronique <i>Electronic torque wrench</i>	De 1,5 à 30 Nm ; Précision 4% <i>Range 1,5 to 30 Nm : Accuracy 4%</i>
02 01 76	Thermomètre indicateur <i>Indicating thermometer</i>	Précision ± 2°C <i>Accuracy ± 2°C</i>
94 03 10	Banc de traction 3 tonnes <i>Tensile test machine 3 tons</i>	Classe 1 <i>Class 1</i>
97 02 02	Réglet étalon <i>Calibrated ruler</i>	Précision 0,5 mm <i>Accuracy 0,5 mm</i>

2.2 **Câbles / Cables**

N° Lot / Identification	07045		
Fourni par / Supplied by	<input checked="" type="checkbox"/> Laboratoire <i>Laboratory</i>	<input type="checkbox"/> Demandeur <i>Applicant</i>	
Norme / Standard	NF C 33-209		
Provenance / From	France		
Section / Cross section	16 mm ²		
Matériau de l'âme / Conductor material	<input type="checkbox"/> Cuivre <i>Copper</i>	<input checked="" type="checkbox"/> Aluminium	<input type="checkbox"/> Alliage d'aluminium <i>Aluminium alloy</i>
Type d'âme / Conductor type	<input type="checkbox"/> Massive <i>Solid</i>	<input checked="" type="checkbox"/> Câblée <i>Stranded</i>	<input type="checkbox"/> Souple <i>Flexible</i>
	<input type="checkbox"/> Rétreinte <i>Compacted</i>	<input checked="" type="checkbox"/> Non rétreinte <i>Non compacted</i>	
Forme d'âme / Conductor shape	<input checked="" type="checkbox"/> Ronde <i>Circular</i>	<input type="checkbox"/> Sectorale <i>Sector-shaped</i>	
Nombre de brins / Number of wires	7		
Ø sur âme / Ø on conductor	4,85 mm		
Matériau de l'isolant Insulation material	Polyéthylène réticulé type TIX-5 <i>Cross-linked polyethylene, TIX-5 type</i>		
Ø sur isolant / Ø on insulation	7,4 mm		
Conditionnement Conditioned on	1 heure à 120°C <i>1 hour at 120°C</i>		
Charge de rupture minimale (CRM) / Minimum Breaking Load (MBL)	1900 N		
Référence du câble HD626 / HD626 conductor reference	4 E-1		



Visa du responsable de l'essai
Visa supervisor of the test

N° Lot / Identification	05024		
Fourni par / Supplied by	<input type="checkbox"/> Laboratoire Laboratory	<input checked="" type="checkbox"/> Demandeur Applicant	
Norme / Standard	UNE 21-030-92		
Provenance / From	Espagne		
Section / Cross section	95 mm ²		
Matériau de l'âme / Conductor material	<input type="checkbox"/> Cuivre Copper	<input checked="" type="checkbox"/> Aluminium	<input type="checkbox"/> Alliage d'aluminium Aluminium alloy
Type d'âme / Conductor type	<input type="checkbox"/> Massive Solid	<input checked="" type="checkbox"/> Câblée Stranded	
	<input checked="" type="checkbox"/> Rétreinte Compacted	<input type="checkbox"/> Non rétreinte Non compacted	<input type="checkbox"/> Souple Flexible
Forme d'âme / Conductor shape	<input checked="" type="checkbox"/> Ronde Circular	<input type="checkbox"/> Sectorale Sector-shaped	
Nb de brins / N. of wires	15		
Ø sur âme / Ø conductor	11,5 mm		
Matériau de l'isolant Insulation material	Polyéthylène réticulé type TIX-3 Cross-linked polyethylene, TIX-3 type		
Ø sur isolant / Ø insulation	15,3 mm		
Conditionnement Conditioned on	1 heure à 120°C 1 hour at 120°C		
Charge de rupture minimale (CRM) / Minimum Breaking Load (MBL)	11400 N		
Référence du câble HD626 / HD626 conductor reference	6K-1		

ВАРНО С ОПИТИНАТА



САМОКОВ Visa du responsable de l'essai
Visa supervisor of the test

3 Méthode / Method

Les essais sur les raccords sont effectués selon les prescriptions du paragraphe 8.1.2.1 de la norme NF EN 50483-4 (07/2009).

L'essai est effectué sur deux raccords pour chaque section.

Le conducteur principal, sur lequel le raccord à perforation d'isolant sera testé, est tendu avec une charge comprise entre 10 % et 15 % de sa CRM pour les conducteurs en aluminium (AAC) et entre 15 % et 20 % de sa CRM pour tous les autres conducteurs définis dans le HD 626 (par exemple le cuivre et l'alliage d'aluminium AAAC).

Les longueurs des conducteurs sont comprises entre 0,5 m et 1,5 m.

Les raccords sont serrés au couple maximal spécifié par le fournisseur.

Un effort de traction mécanique doit être appliqué sur le conducteur principal jusqu'à atteindre les valeurs indiquées au paragraphe 8.1.2.1.3.

L'effort est maintenu pendant 60 s.

Connectors are tested in accordance with clause 8.1.2.1 of NF EN 50483-4 (07/2009) standard.

The test is carried out on two connectors for each cross-section.

The main conductor is tensioned to between 10 % and 15% of its MBL for Aluminium (AAC) conductors and between 15 % and 20 % of its MBL for all other conductors as defined in HD 626 (for example Copper and Aluminium alloy AAAC).

The connectors are located at the center of the main core, secured between two anchorages 0,5 m to 1,5 m apart.

The connectors are tightened to the manufacturer's specified maximum torque.

A tensile load test is applied to the main core until it reaches the values indicated in clause 8.1.2.1.3.

The load is maintained for 60 s.

3.1 Conditions ambiantes / Ambient conditions

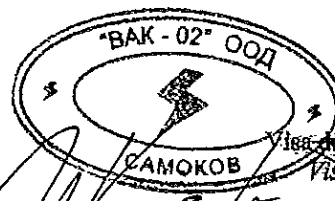
Les conditions ambiantes relevées lors de l'essai sont les suivantes :

Ambient conditions when performing the test are as follows :

	Exigences Requirements	Relevés Results
Température ambiante et humidité <i>Ambient temperature and humidity conditions</i>	15 °C ≤ T° ≤ 30 °C 25 % ≤ HR ≤ 75 %	21 °C 35 %HR

3.2 Configuration des échantillons / Samples configuration

Echantillon n° Sample n.	Section/ Cross section (mm ²)		Tension du conducteur principal pour serrage / Main conductor tensile strength for tightening (N)
	Câble principal Main cable	Câble dérivé Tap cable	10% - 15% CRM / MBL
1	95	Satellite	1140 - 1710
2			
3	16	Satellite	190 - 285
4			



Visa du responsable de l'essai
Visa of the holder of the test

3.3 Relevés des couples de serrage / Tightening torque values

Echantillon n° Sample n.	Couples de serrage du connecteur Connector tightening torques (Nm)
1	17,07
2	16,21
3	16,31
4	16,14

4 Exigences / Requirements

Echantillon n° Sample n.	Vitesse de montée programmée Planned increase rate (N/min)	
	Exigences Requirements	Résultats Results
1	Entre 1000 et 5000 Between 1000 and 5000	3000
2		3000
3		3000
4		3000

Echantillon n° Sample n.	Effort pendant 1 minute Strength during 1 min (N)		
	Exigences Requirements	Résultats Results	
		min	max
1	6840 ± 5 %	6798	6846
2	6498 ≤ ... ≤ 7182	6782	6843
3	1200 ± 5 %	1192	1208
4	1140 ≤ ... ≤ 1260	1191	1204

5 Conclusion / Conclusion

Aucune rupture de l'âme du conducteur principal n'est constatée.
No breakdown of the main core is observed throughout the application of the load.

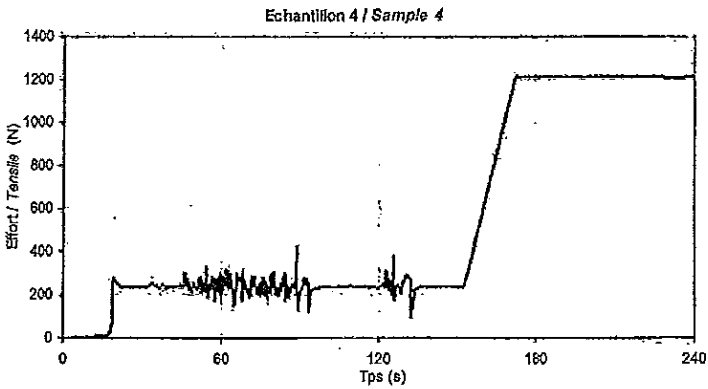
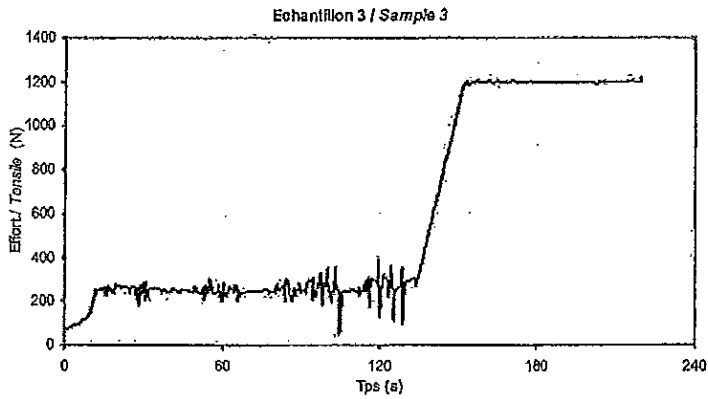
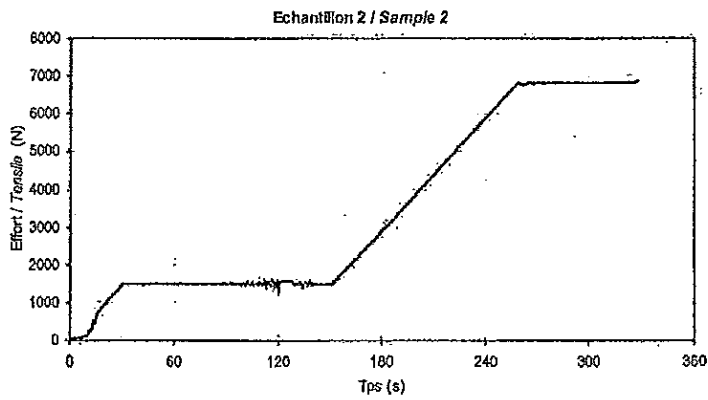
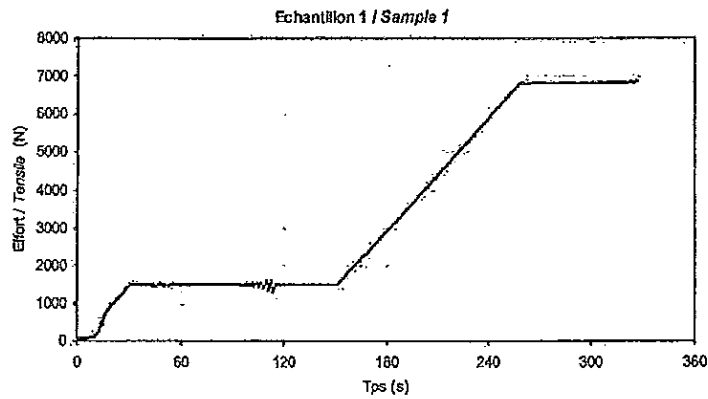
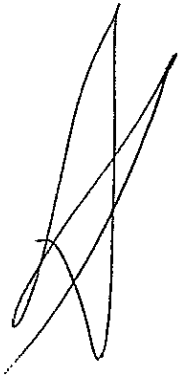
ВЯРНО С ОПРИГИНАЛАТА



Signature of the responsible person for the test
Responsable de l'essai / Test supervisor

Handwritten number 134

6 Courbes / Curves



FIN DU RAPPORT D'ESSAI / END OF TEST REPORT

Handwritten signature

BRANCO OPTIMIZATA

Stamp: **LABEP**
Visa du responsable de l'essai / Supervisor of the test
CAMOKOB
Handwritten signature



Laboratoire d'essais
LABEP

SICAME GROUP



Rapport d'essai
Test report

: Essai de montage à basse température
: Installation test at low temperature

Rapport d'essai n°	: 11 12 240	Test report n.	: 11 12 240
Constructeur	: SICAME	Product brand	: SICAME
Référence produit	: TTD2CCA	Product type	: TTD2CCA
Demandeur de l'essai	: SICAME S.A.	Test applied by	: SICAME S.A.
Date d'essai	: 31 janvier 2012	Date of the test	: 31 January 2012
Date d'émission du rapport	: 07 février 2012	Report emission date	: 07 February 2012

Essais réalisés suivant : NF EN 50483-4 (07/2009), §8.1.4
Tests carried out in accordance with

Ce rapport comprend : 6 pages
This report contains

Conclusion : Les connecteurs à perforation d'isolant BT SICAME de type TTD2CCA soumis à essai satisfont aux exigences du § 8.1.4 de la norme NF EN 50483-4 (07/2009).
Pour déclarer la conformité, il n'a pas été tenu explicitement compte de l'incertitude associée au résultat.

Conclusion : The tested SICAME LV insulation piercing connectors TTD2CCA comply with the requirements of NF EN 50483-4 § 8.1.4 (July 2009) standard.
To give a ruling on the conformity, the uncertainty associated to the result is not implicitly involved

На основании чл. 2
от 33ЛД

L'accréditation de la section essais du COFRAC atteste de la compétence des laboratoires pour les seuls essais couverts par l'accréditation. Ce rapport ne concerne que les produits référencés ci-dessus. La reproduction de ce rapport d'essais n'est autorisée que sous forme intégrale, avec l'accord de SICAME S.A.

Accreditation 1-1068. Scope on request.

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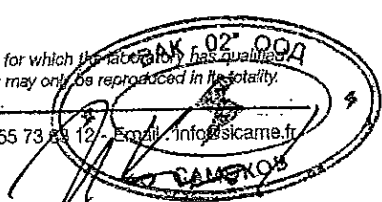
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D 0194 DT



836

1 Echantillons soumis à essai / Samples under test

Type : Connecteur à perforation d'isolant (raccord temporaire)
Insulation piercing connector (temporary connector)

Designation / Designation : TTD2CCA

Fabricant / Manufacturer : SICAME

Numéro de lot / Batch number : 11M307140

Echantillons conformes au plan E0680165
Samples compliant with drawing n. E0680165

Couples de serrage <i>Tightening torques</i>	
Minimal	13 Nm
Nominal	14 Nm
Maximal	16 Nm

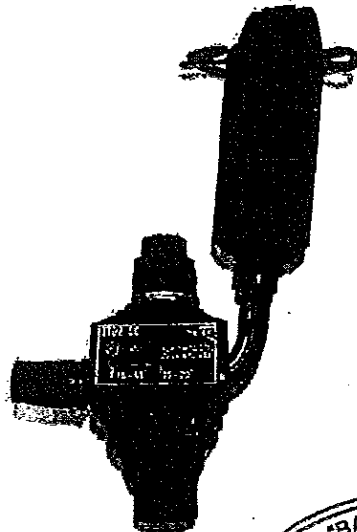
Plage de sections <i>Cross-section range</i>		
	Principal <i>Main</i>	Dérivé <i>Tap</i>
Min	16 mm ²	Satellite
Max	95 mm ²	

Classes du produit selon NF EN 50483-1 (§9.3) <i>Classes of product in accordance with NF EN 50483-1 (§9.3)</i>	
<input type="checkbox"/>	Classe A : raccords soumis aux cycles de vieillissement électrique et aux essais de court-circuit <i>Class A : connectors subjected to electrical ageing cycles and short-circuits</i>
<input type="checkbox"/>	Classe B : raccords soumis seulement aux cycles de vieillissement électrique <i>Class B : connectors subjected only to electrical ageing cycles</i>
<input checked="" type="checkbox"/>	Classe 1 : raccords soumis à l'essai de tenue diélectrique dans l'eau <i>Class 1 : connectors subjected to a.c. voltage withstand test in water</i>
<input type="checkbox"/>	Classe 2 : raccords soumis à l'essai de tenue diélectrique dans l'air <i>Class 2 : connectors subjected to a.c. voltage withstand test in air</i>

Nombre d'échantillons / Number of samples : 4

Repérage / Identification : 1, 2, 3, 4

Date de réception au laboratoire : 14 décembre 2011
Reception date at the laboratory : 14 December 2011



ВАРНИК С ОПИТИВАЊАТА



Visa du responsable de l'essai
visa supervisor of the test

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LABEL

2 Caractéristiques du matériel / Equipment used during test

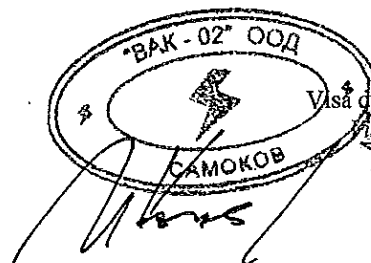
2.1 Appareillage utilisé / Equipment used

N° U.T.	Désignation / Designation	Caractéristiques / Characteristic
10 00 27	Clé à couple électronique <i>Electronic torque wrench</i>	De 1,5 à 30 Nm : Précision 4% <i>Range 1,5 to 30 Nm ; Accuracy 4%</i>
02 01 76	Thermomètre indicateur <i>Indicating thermometer</i>	Précision ± 2°C <i>Accuracy ± 2°C</i>
04 00 14	Buzzer	9 V
10 03 21	Chambre froide <i>Low temperature chamber</i>	Précision 1°C <i>Accuracy 1°C</i>

2.2 Câbles / Cables

N° Lot / Identification	07045		
Fourni par / Supplied by	<input checked="" type="checkbox"/> Laboratoire <i>Laboratory</i>	<input type="checkbox"/> Demandeur <i>Applicant</i>	
Norme / Standard	NF C 33-209		
Provenance / From	France		
Section / Cross section	16 mm ²		
Matériau de l'âme / Conductor material	<input type="checkbox"/> Cuivre <i>Copper</i>	<input checked="" type="checkbox"/> Aluminium	<input type="checkbox"/> Alliage d'aluminium <i>Aluminium alloy</i>
Type d'âme / Conductor type	<input type="checkbox"/> Massive <i>Solid</i>	<input checked="" type="checkbox"/> Câblée <i>Stranded</i>	<input type="checkbox"/> Souple <i>Flexible</i>
	<input type="checkbox"/> Rétreinte <i>Compacted</i>	<input checked="" type="checkbox"/> Non rétreinte <i>Non compacted</i>	
Forme d'âme / Conductor shape	<input checked="" type="checkbox"/> Ronde <i>Circular</i>	<input type="checkbox"/> Sectorale <i>Sector-shaped</i>	
Nombre de brins / Number of wires	7		
Ø sur âme / Ø on conductor	4,85 mm		
Matériau de l'isolant Insulation material	Polyéthylène réticulé type TIX-5 <i>Cross-linked polyethylene, TIX-5 type</i>		
Ø sur isolant / Ø on insulation	7,4 mm		
Conditionnement Conditioned on	1 heure à 120°C <i>1 hour at 120°C</i>		
Référence du câble HD626 / HD626 conductor reference	4 E-1		

ВАРНО С ОПРИТНАТА



Visa du responsable de l'essai
isa supervisor of the test

838

N° Lot / Identification	05024		
Fourni par / Supplied by	<input type="checkbox"/> Laboratoire Laboratory	<input checked="" type="checkbox"/> Demandeur Applicant	
Norme / Standard	UNE 21-030-92		
Provenance / From	Espagne		
Section / Cross section	95 mm ²		
Matériau de l'âme / Conductor material	<input type="checkbox"/> Cuivre Copper	<input checked="" type="checkbox"/> Aluminium	<input type="checkbox"/> Alliage d'aluminium Aluminium alloy
Type d'âme / Conductor type	<input type="checkbox"/> Massive Solid	<input checked="" type="checkbox"/> Câblée Stranded	
	<input checked="" type="checkbox"/> Rétreinte Compacted	<input type="checkbox"/> Non rétreinte Non compacted	<input type="checkbox"/> Souple Flexible
Forme d'âme / Conductor shape	<input checked="" type="checkbox"/> Ronde Circular	<input type="checkbox"/> Sectorale Sector-shaped	
Nb de brins / N. of wires	15		
Ø sur âme / Ø conductor	11,5 mm		
Matériau de l'isolant Insulation material	Polyéthylène réticulé type TIX-3 Cross-linked polyethylene, TIX-3 type		
Ø sur isolant / Ø insulation	15,3 mm		
Conditionnement/ Conditioned on	1 heure à 120°C 1 hour at 120°C		
Référence du câble HD626 / HD626 conductor reference	6K-1		

ВЯРНО С ОРИГИНАЛА

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 ВИСА на ответственного за испытание
 Witness supervisor of the test
 САМОКОВ

3 Essai / Test procedure

Les essais sont effectués selon les prescriptions du paragraphe 8.1.4 de la norme NF EN 50483-4 (07/2009).

L'essai est effectué sur deux raccords pour chaque section.

Le raccord et les conducteurs sont au préalable pré-conditionnés jusqu'à la température d'essai de $(-10 \pm 3)^\circ\text{C}$, ensuite ils sont assemblés à cette température dans la chambre froide.

La continuité électrique est mesurée entre les câbles principal et dérivé.

Le connecteur à perforation d'isolant est monté conformément aux instructions du fabricant en utilisant le couplemètre.

La continuité électrique est établie à une valeur de couple inférieure ou égale à 70% du couple minimal spécifié par le fournisseur.

Connectors are tested in accordance with NF EN 50483-4 (07/2009) §8.1.4 standard.

The test is carried out on two connectors for each cross-section.

The connectors and core are further pre-conditioned until they reach the test temperature of $(-10 \pm 3)^\circ\text{C}$, before they are assembled.

Electrical continuity is measured between the main and branch cables.

Assembly is made in the cold temperature chamber, $(-10 \pm 3)^\circ\text{C}$.

The IPC is installed in accordance with the manufacturer's instructions using a torque meter.

Electrical continuity shall be achieved at a torque value less, or equal to, 70 % of the manufacturer's specified minimum installation torque.

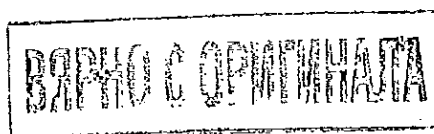
3.1 Conditions ambiantes / Ambient conditions

	Exigences <i>Requirements</i>	Relevés <i>Results</i>
Température ambiante et humidité <i>Ambient temperature and humidity conditions</i>	$15^\circ\text{C} \leq T^\circ \leq 30^\circ\text{C}$ $25\% \leq \text{HR} \leq 75\%$	21 °C 35 %HR
Température de la chambre froide <i>Low temperature chamber</i>	$(-10 \pm 3)^\circ\text{C}$	-10,6 °C

	Relevés <i>Results</i>
Temps de conditionnement <i>Conditionnement time</i>	1 h 30

3.2 Configuration des échantillons / Samples configuration

Connecteur n° <i>Connector n.</i>	Section/ Cross section (mm ²)	
	Câble principal <i>Main cable</i>	Câble dérivé <i>Tap cable</i>
1	95	Satellite
2		
3	16	Satellite
4		



Signature of the test supervisor

4 Relevés des couples de serrage / Tightening torque values

	Exigences Requirements	Relevés / Results			
		Echantillon / Sample			
		1	2	3	4
Couple de serrage pour la continuité électrique (Nm) Tightening torques for electrical continuity (Nm)	≤ 9,1	8,12	8,33	8,42	7,13

5 Conclusion / Conclusion

La continuité électrique est établie à une valeur de couple inférieure à 70% du couple minimal spécifié par le fournisseur.

Electrical continuity is achieved at a torque value less to 70 % of the manufacturer's specified minimum installation torque.

FIN DU RAPPORT D'ESSAI / END OF TEST REPORT

ВІСНОВОК ОПИТАННЯ



Visa du responsable de l'essai
Visa supervisor of the test



Laboratoire d'essais
LABEP

SICAME GROUP



Rapport d'essai
Test report

: Essai au choc à basse température
: Low temperature impact test

Rapport d'essai n°	: 11 12 220	Test report n.	: 11 12 220
Constructeur	: SICAME	Product brand	: SICAME
Référence produit	: TTD2CCA	Product type	: TTD2CCA
Demandeur de l'essai	: SICAME S.A.	Demander of the test	: SICAME S.A.
Date d'essai	: 31 janvier 2012	Date of the test	: 31 January 2012
Date d'émission du rapport	: 06 février 2011	Report emission date	: 06 February 2012

Essais réalisés suivant : NF EN 50483-4 (07/2009), § 8.1.2.5
Tests carried out in accordance with

Ce rapport comprend : 5 pages
This report contains

Conclusion : Les connecteurs à perforation d'isolant BT SICAME de type TTD2CCA soumis à essai satisfont aux exigences du § 8.1.2.5 de la norme NF EN 50483-4 (07/2009).
Pour déclarer la conformité, il n'a pas été tenu explicitement compte de l'incertitude associée au résultat.

Conclusion : The tested SICAME LV insulation piercing connectors TTD2CCA comply with the requirements of clause 8.1.2.5 of NF EN 50483-4 (July 2009) standard.
To give a ruling on the conformity, the uncertainty associated to the result is not implicitly involved

На основании чл. 2
от ЗЗЛД

L'accréditation de la section essais du COFRAC atteste de la compétence des laboratoires pour les seuls essais couverts par l'accréditation.
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842

1 Echantillons soumis à essai / Samples under test

Type : Connecteur à perforation d'isolant (raccord temporaire)
Insulation piercing connector (temporary connector)

Désignation / Designation : TTD2CCA

Fabricant / Manufacturer : SICAME

Numéro de lot / Batch number : 11M307140
Echantillons conformes au plan E0680165
Samples compliant with drawing n. E0680165

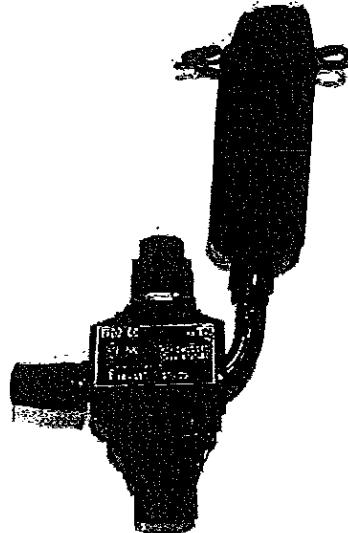
Couples de serrage <i>Tightening torques</i>	
Minimal	13 Nm
Nominal	14 Nm
Maximal	16 Nm

Plage de sections <i>Cross-section range</i>		
	Principal <i>Main</i>	Dérivé <i>Tap</i>
Min	16 mm ²	Satellite
Max	95 mm ²	

Classes du produit selon NF EN 50483-1 (§9.3) <i>Classes of product in accordance with NF EN 50483-1 (§9.3)</i>	
<input type="checkbox"/>	Classe A : raccords soumis aux cycles de vieillissement électrique et aux essais de court-circuit <i>Class A : connectors subjected to electrical ageing cycles and short-circuits</i>
<input type="checkbox"/>	Classe B : raccords soumis seulement aux cycles de vieillissement électrique <i>Class B : connectors subjected only to electrical ageing cycles</i>
<input checked="" type="checkbox"/>	Classe 1 : raccords soumis à l'essai de tenue diélectrique dans l'eau <i>Class 1 : connectors subjected to a.c. voltage withstand test in water</i>
<input type="checkbox"/>	Classe 2 : raccords soumis à l'essai de tenue diélectrique dans l'air <i>Class 2 : connectors subjected to a.c. voltage withstand test in air</i>

Nombre d'échantillons / Number of samples : 2
Repérage / Identification : 1, 2

Date de réception au laboratoire : 14 décembre 2011
Reception date at the laboratory : 14 December 2011



ВАРНО С ОРНИТНАСТА

“BAK - 02” ООД
Visa du responsable de l'essai
Visa supervisor of the test
САМОКОНТРОЛ
[Signature]

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0417

2 Caractéristiques du matériel / Equipment used during test

2.1 Appareillage utilisé / Equipment used

N° U.T.	Désignation / Designation	Caractéristique / Characteristic
100027	Clé à couple électronique <i>Electronic torque wrench.</i>	De 1,5 à 30 Nm ; Précision 4% <i>Range 1,5 to 30 Nm : Accuracy 4%</i>
020176	Thermomètre indicateur <i>Indicating thermometer</i>	Précision ± 2°C <i>Accuracy ± 2°C</i>
110173	Montage d'essai de choc à basse température <i>Low temperature impact test device</i>	Marteau : 900 g Enclume : 100 g <i>Hammer : 900 g Anvil : 100 g</i>
100321	Chambre froide <i>Low temperature chamber</i>	Précision ± 1 °C <i>Accuracy ± 1°C</i>

2.2 Câbles / Cables

N° Lot / Identification	05024		
Fourni par / Supplied by	<input type="checkbox"/> Laboratoire <i>Laboratory</i>	<input checked="" type="checkbox"/> Demandeur <i>Applicant</i>	
Norme / Standard	UNE 21-030-92		
Provenance / From	Espagne		
Section / Cross section	95 mm ²		
Matériau de l'âme / Conductor material	<input type="checkbox"/> Cuivre <i>Copper</i>	<input checked="" type="checkbox"/> Aluminium	<input type="checkbox"/> Alliage d'aluminium <i>Aluminium alloy</i>
Type d'âme / Conductor type	<input type="checkbox"/> Massive <i>Solid</i>	<input checked="" type="checkbox"/> Câblée <i>Stranded</i>	<input type="checkbox"/> Souple <i>Flexible</i>
	<input checked="" type="checkbox"/> Rétreinte <i>Compacted</i>	<input type="checkbox"/> Non rétreinte <i>Non compacted</i>	
Forme d'âme / Conductor shape	<input checked="" type="checkbox"/> Ronde <i>Circular</i>	<input type="checkbox"/> Sectorale <i>Sector-shaped</i>	
Nb de brins / N. of wires	15		
Ø sur âme / Ø conductor	11,5 mm		
Matériau de l'isolant Insulation material	Polyéthylène réticulé type TIX-3 <i>Cross-linked polyethylene, TIX-3 type</i>		
Ø sur isolant / Ø insulation	15,3 mm		
Conditionnement Conditioned on	1 heure à 120°C <i>1 hour at 120°C</i>		
Référence du câble HD626 / HD626 conductor reference	6K-1		

ВЕРНО С ОФИЦИАЛТА



Visa du responsable de l'essai
Test supervisor of the test

844

3 Essai / Test procedure

Les essais sont effectués selon les prescriptions du paragraphe 8.1.2.5 de la norme NF EN 50483-4 (07/2009).

L'essai est effectué sur deux raccords pour chaque section.

Les raccords et les conducteurs sont placés dans une enceinte à température contrôlée à $(-10 \pm 3) ^\circ\text{C}$, jusqu'à ce qu'ils atteignent la température d'essai.

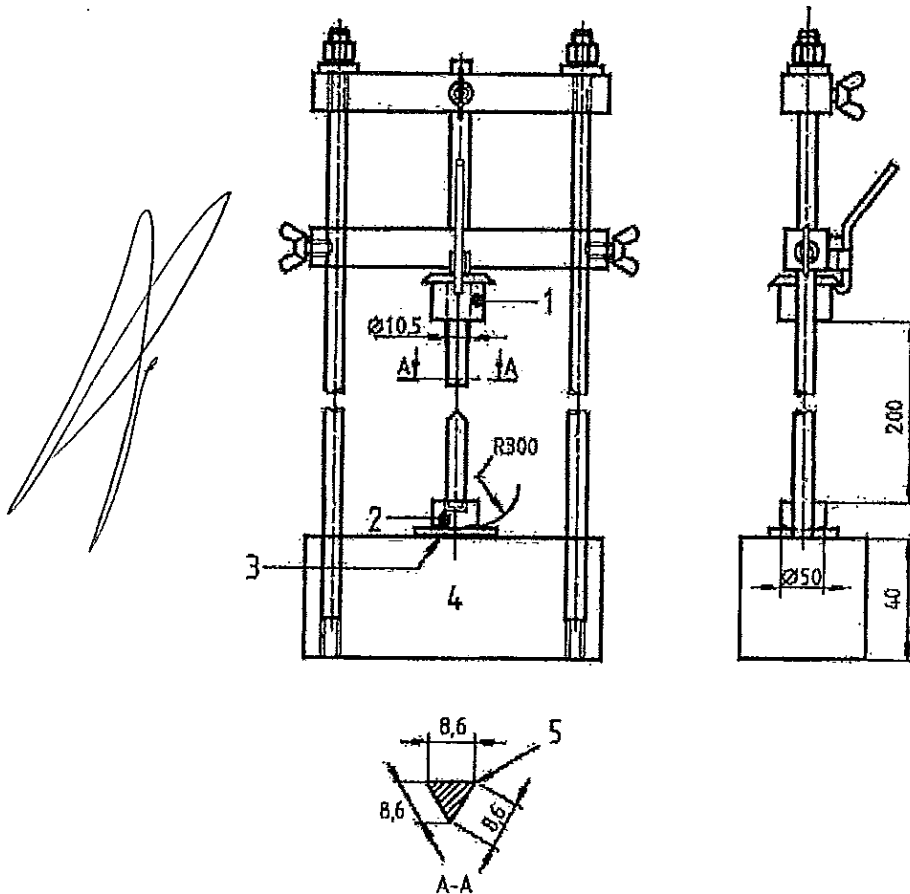
La figure ci dessous décrit l'exemple du dispositif d'essai.

Connectors are tested in accordance with NF EN 50483-4 (07/2009) § 8.1.2.5 standard.

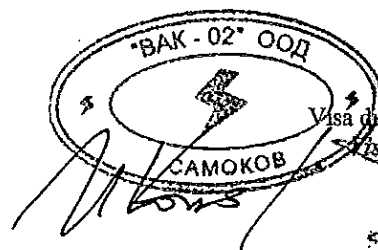
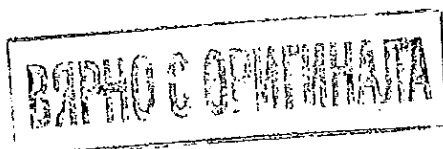
The test is carried out on two connectors for each cross-section.

The connectors and the cores shall be placed in a temperature controlled environment at $(-10 \pm 3) ^\circ\text{C}$, until they reach the test temperature.

Figure below shows the test arrangement



- | | | | |
|---|--|---|---|
| 1 | marteau de 900 g / hammer 900g | 4 | bloc en acier de 10 kg / steel 10 kg |
| 2 | pièce intermédiaire en acier de 100g
steel intermediate piece 100 g | 5 | angles légèrement arrondis / slightly round angle |
| 3 | pièce d'essai / test piece | | |



Visa du responsable de l'essai
Test supervisor of the test

Les échantillons sont placés séparément sur le dispositif de l'essai de choc et subissent un choc avec une enclume cylindrique d'un diamètre d'environ 50 mm disposant d'une surface de contact sphérique d'un rayon d'environ 300 mm. L'enclume a une masse d'environ 100g et transfère à l'échantillon l'énergie d'impact d'un poids de 900 g tombant librement de 200 mm.

Deux chocs sont effectués sur chaque échantillon, l'un agissant sur le dessus et l'autre agissant sur le côté.

The separate samples are placed in the impact test device and impacted with a cylindrical anvil approximately 50 mm in diameter with a spherical contact radius of approximately 300 mm. The anvil have a mass of approximately 100 g and transfer to the test sample the impact energy of a weight of 900 g falling freely through 200 mm.

Two impacts are made on each sample, one acting from the top and one acting on the side.

3.1 Conditions ambiantes / Ambient conditions

	Exigences Requirements	Relevés Results
Température ambiante et humidité Ambient temperature and humidity conditions	15 °C ≤ T° ≤ 30 °C 25 % ≤ HR ≤ 75 %	21 °C 35 %HR
Température de la chambre froide (°C) Low temperature chamber (°C)	- 10 ± 3	-11,1

	Relevés Results
Temps de conditionnement Conditionnement time	1 h 25

3.2 Configuration des échantillons / Samples configuration

Connecteur n° Connector n.	Section / Cross section (mm ²)	
	Câble principal Main cable	Câble dérivé Tap cable
1	95	Satellite
2		

4 Résultats / Results

Echantillon n° Sample n.	Couples de serrage (Rupture tête fusible) Tightening torques (breaking shear head) (Nm)	Choc sur le dessus Impact on the top	Choc sur le côté Impact on the side
1	15,25	Aucune détérioration No damage	Aucune détérioration No damage
2	15,94	Aucune détérioration No damage	Aucune détérioration No damage

5 Conclusion / Conclusion

Le connecteur n'est pas endommagé.

The connector is undamaged.

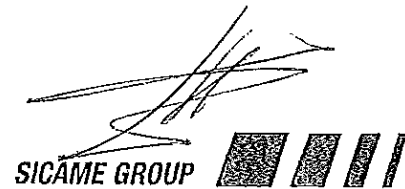
FIN DU RAPPORT D'ESSAI / END OF TEST REPORT

ВЕРНО С ОПИРАЮЩАТА

Visa du responsable de l'essai
Visa supervisor of the test
CAMOKOB



Laboratoire d'essais
LABEP



Rapport d'essai
Test report

: Essai de tenue diélectrique
: Dielectrical voltage test

Rapport d'essai n°	: 11 12 230	Test report n.	: 11 12 230
Constructeur	: SICAME	Product brand	: SICAME
Référence produit	: TTD2CCA	Product type	: TTD2CCA
Demandeur de l'essai	: SICAME S.A.	Demandeur of the test	: SICAME S.A.
Date d'essai	: 01 février 2012	Date of the test	: 01 February 2012
Date d'émission du rapport	: 07 février 2012	Report emission date	: 07 February 2012

Essais réalisés suivant : NF EN 50483-4 (07/2009), § 8.1.3.1
Tests carried out in accordance with

Ce rapport comprend : 7 pages
This report contains

Conclusion : Les connecteurs à perforation d'isolant BT SICAME de type TTD2CCA soumis à essai satisfont aux exigences du § 8.1.3.1 de la norme NF EN 50483-4 (07/2009).
Pour déclarer la conformité, il n'a pas été tenu explicitement compte de l'incertitude associée au résultat.

Conclusion : The tested SICAME LV insulation piercing connector TTD2CCA comply with the requirements of clause 8.1.3.1 of NF EN 50483-4 (July 2009) standard.
To give a ruling on the conformity, the uncertainty associated to the result is not implicitly involved

На основании чл. 2
от ЗЗЛД

L'accréditation de la section essais du COFRAC atteste de la compétence des laboratoires pour les seuls essais couverts par l'accréditation.
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ESSAIS

D 0164 07

X 47

1 Echantillons soumis à essai / Samples under test

Type : Connecteur à perforation d'isolant (raccord temporaire)
Insulation piercing connector (temporary connector)

Désignation / Designation : TTD2CCA

Fabricant / Manufacturer : SICAME

Numéro de lot / Batch number : 11M307140
 Echantillons conformes au plan E0680165
Samples compliant with drawing n. E0680165

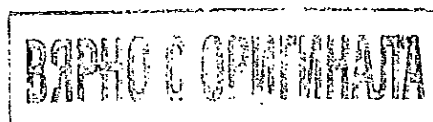
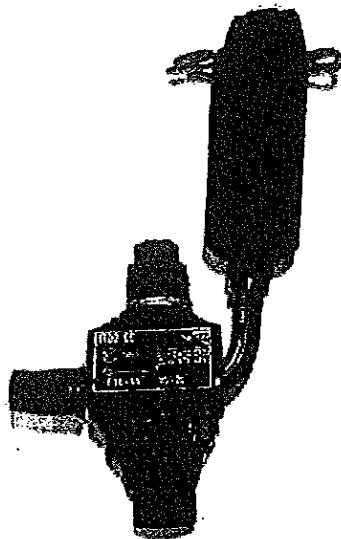
Couples de serrage <i>Tightening torques</i>	
Minimal	13 Nm
Nominal	14 Nm
Maximal	16 Nm

Plage de sections <i>Cross-section range</i>		
	Principal <i>Main</i>	Dérivé <i>Tap</i>
Min	16 mm ²	Satellite
Max	95 mm ²	

Classes du produit selon NF EN 50483-1 (§9.3) <i>Classes of product in accordance with NF EN 50483-1 (§9.3)</i>	
<input type="checkbox"/>	Classe A : raccords soumis aux cycles de vieillissement électrique et aux essais de court-circuit <i>Class A : connectors subjected to electrical ageing cycles and short-circuits</i>
<input type="checkbox"/>	Classe B : raccords soumis seulement aux cycles de vieillissement électrique <i>Class B : connectors subjected only to electrical ageing cycles</i>
<input checked="" type="checkbox"/>	Classe 1 : raccords soumis à l'essai de tenue diélectrique dans l'eau <i>Class 1 : connectors subjected to a.c. voltage withstand test in water</i>
<input type="checkbox"/>	Classe 2 : raccords soumis à l'essai de tenue diélectrique dans l'air <i>Class 2 : connectors subjected to a.c. voltage withstand test in air</i>

Nombre d'échantillons / Number of samples : 4
 Repérage / Identification : 1, 2, 3, 4

Date de réception au laboratoire : 14 décembre 2011
 Reception date at the laboratory : 14 December 2011



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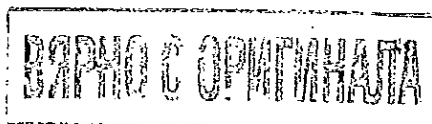
2 Caractéristiques du matériel / Equipment used during test

2.1 Appareillage utilisé / Equipment used

N° U.T.	Désignation / Designation	Caractéristiques / Characteristic
10 00 27	Clé à couple électronique <i>Electronic torque wrench</i>	De 1,5 à 30 Nm : Précision 4% <i>Range 1,5 to 30 Nm : Accuracy 4%</i>
91 02 69	Diélectrimètre BOUCHET (10 kV) <i>Dielectrimer BOUCHET (10 kV)</i>	Précision 0,5mA et 200V <i>Accuracy 0,5mA and 200V</i>
03 02 56	Chronomètre <i>Stop watch</i>	Précision 1 s <i>Accuracy 1s</i>
97 02 02	Réglet étalon <i>Calibrated ruler</i>	Précision 0,5 mm <i>Accuracy 0,5 mm</i>
04 00 30	Thermomètre étanche <i>Watertight thermometer</i>	Précision 1°C <i>Accuracy 1°C</i>
02 01 76	Thermomètre indicateur <i>Indicating thermometer</i>	Précision ± 2°C <i>Accuracy ± 2°C</i>
99 00 41	Conductimètre <i>Conductimeter</i>	Précision 30 µS/cm <i>Accuracy 30µS/cm</i>

2.2 Câbles / Cables

N° Lot / Identification	07045		
Fourni par / Supplied by	<input checked="" type="checkbox"/> Laboratoire <i>Laboratory</i>	<input type="checkbox"/> Demandeur <i>Applicant</i>	
Norme / Standard	NF C 33-209		
Provenance / From	France		
Section / Cross section	16 mm ²		
Matériau de l'âme / Conductor material	<input type="checkbox"/> Cuivre <i>Copper</i>	<input checked="" type="checkbox"/> Aluminium	<input type="checkbox"/> Alliage d'aluminium <i>Aluminium alloy</i>
Type d'âme / Conductor type	<input type="checkbox"/> Massive <i>Solid</i>	<input checked="" type="checkbox"/> Câblée <i>Stranded</i>	
	<input type="checkbox"/> Rétreinte <i>Compacted</i>	<input checked="" type="checkbox"/> Non rétreinte <i>Non compacted</i>	<input type="checkbox"/> Souple <i>Flexible</i>
Forme d'âme / Conductor shape	<input checked="" type="checkbox"/> Ronde <i>Circular</i>	<input type="checkbox"/> Sectorale <i>Sector-shaped</i>	
Nombre de brins / Number of wires	7		
Ø sur âme / Ø on conductor	4,85 mm		
Matériau de l'isolant Insulation material	Polyéthylène réticulé type TIX-5 <i>Cross-linked polyethylene, TIX-5 type</i>		
Ø sur isolant / Ø on insulation	7,4 mm		
Conditionnement Conditioned on	1 heure à 120°C <i>1 hour at 120°C</i>		
Référence du câble HD626 / HD626 conductor reference	4 E-1		



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N° Lot / Identification	05024		
Fourni par / Supplied by	<input type="checkbox"/> Laboratoire Laboratory	<input checked="" type="checkbox"/> Demandeur Applicant	
Norme / Standard	UNE 21-030-92		
Provenance / From	Espagne		
Section / Cross section	95 mm ²		
Matériau de l'âme / Conductor material	<input type="checkbox"/> Cuivre Copper	<input checked="" type="checkbox"/> Aluminium	<input type="checkbox"/> Alliage d'aluminium Aluminium alloy
Type d'âme / Conductor type	<input type="checkbox"/> Massive Solid	<input checked="" type="checkbox"/> Câblée Stranded	<input type="checkbox"/> Souple Flexible
	<input checked="" type="checkbox"/> Rétreinte Compacted	<input type="checkbox"/> Non rétreinte Non compacted	
Forme d'âme / Conductor shape	<input checked="" type="checkbox"/> Ronde Circular	<input type="checkbox"/> Sectorale Sector-shaped	
Nb de brins / N. of wires	15		
Ø sur âme / Ø conductor	11,5 mm		
Matériau de l'isolant Insulation material	Polyéthylène réticulé type TIX-3 Cross-linked polyethylene, TIX-3 type		
Ø sur isolant / Ø insulation	15,3 mm		
Conditionnement Conditioned on	1 heure à 120°C 1 hour at 120°C		
Référence du câble HD626 / HD626 conductor reference	6K-1		

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ВАРНО С ОПИТНАТА



 Visa du responsable de l'essai
 Visa supervisor of the test

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3 Essai / Test procedure

Les essais sont effectués selon les prescriptions du paragraphe 8.1.3.1 de la norme NF EN 50483-4 (07/2009). Les connecteurs de classe 1 sont testés dans l'eau.

Les connecteurs sont montés sur des conducteurs principaux des sections minimale et maximale et sur des conducteurs dérivés de la section minimale.

Les connecteurs sont serrés jusqu'à la valeur minimale du couple indiquée par le constructeur.

L'ensemble formé par le connecteur et les conducteurs, maintenu d'une façon rigide et appropriée, est placé au fond d'un bac rempli d'eau sur 30 cm de hauteur mesurée au niveau de la partie supérieure du connecteur, les extrémités des conducteurs émergeant suffisamment du bain pour éviter un contournement extérieur. La résistivité de l'eau ne dépasse pas 200 Ωm (NF EN 50483-1 de 07/2009, § 9.1.6) et la température est notée pour information.

Le générateur de tension utilisé est réglé pour déclencher sous un courant de fuite de $(10,0 \pm 0,5)$ mA (NF EN 50483-1 de 07/2009, § 8.1.5).

Après une durée d'immersion de 30 min, l'ensemble est soumis à un essai diélectrique sous une tension de 6 kV à fréquence industrielle (fréquence : 50 Hz) pendant 1 min. On effectue la montée progressive en tension à une vitesse d'environ 1 kV/s (NF EN 50483-1 § 9.1.7 de 07/2009).

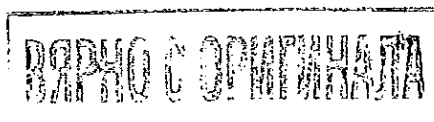
Connectors are tested in accordance with NF EN 50483-4 (07/2009) § 8.1.3.1 standard. Class 1 connectors are tested in water.

Connectors are tightened to the minimum torque indicated by the manufacturer. They are mounted on the smallest and largest cross-sections on the main core and on the smallest cross-section on the tap core.

The assembly of connector and cores, maintained in a rigid and appropriate way, is placed at the bottom of a water tank. The water height is 30 cm measured from the upper part of the connector, and the cores are long enough out of the water to prevent flashover. The resistivity of the water is less than 200 Ωm (NF EN 50483-1 07/2009, § 9.1.6) and its temperature is recorded for information.

The voltage generator is tripping for a leakage current of (10.0 ± 0.5) mA (NF EN 50483-1 07/2009, § 9.1.5).

After 30 min under water, the voltage test is applied to the sample with a 6 kV a.c. voltage (frequency: 50 Hz) for 1 minute. The a.c. voltage is applied to a rate of approximately 1 kV/s (NF EN 50483-1 07/2009, § 9.1.7).



Visa du responsable de l'essai
Test supervisor of the test

3.1 Conditions ambiantes / Ambient conditions

Les conditions ambiantes relevées lors de l'essai sont les suivantes :
Ambient conditions when performing the test are as follows :

	Exigences <i>Requirements</i>	Relevés <i>Results</i>
Température ambiante et humidité <i>Ambient temperature and humidity conditions</i>	15 °C ≤ T° ≤ 30 °C 25 % ≤ HR ≤ 75 %	22 °C 33 %HR
Température de l'eau <i>Water temperature</i>	-	20,5 °C
Résistivité de l'eau <i>Water resistivity</i>	< 200 Ωm	33,7 Ωm

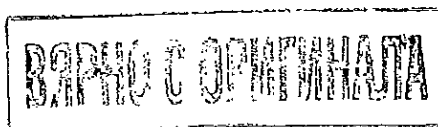
	Exigences <i>Requirements</i>	Relevés <i>Results</i>
Temps d'immersion <i>Immersion time</i>	30 min	30 min
Vitesse de montée en tension <i>Voltage increase rate</i>	≈ 1 kV/s	≈ 1 kV/s

3.2 Configuration des échantillons / Samples configuration

Connecteur n° <i>Connector n.</i>	Section/ Cross section (mm²)	
	Câble principal <i>Main cable</i>	Câble dérivé <i>Tap cable</i>
1	16	Satellite
2		
3	95	Satellite
4		

3.3 Relevés des couples de serrage / Tightening torque values

Echantillon n° <i>Sample n.</i>	Couples de serrage <i>Tightening torques</i> (Nm)
1	13,19
2	13,00
3	13,11
4	13,21



Visa du responsable de l'essai
Visa supervisor of the test

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4 Résultats / Results

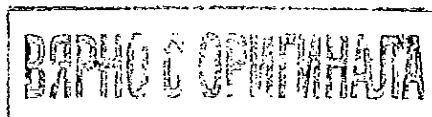
Echantillon n° Sample n.	Exigences Requirements	Résultats Results
1	6 kV pendant 1 min : pas de claquage <i>6 kV for 1 min : no breakdown</i>	Pas de claquage <i>No breakdown</i>
2	6 kV pendant 1 min : pas de claquage <i>6 kV for 1 min : no breakdown</i>	Pas de claquage <i>No breakdown</i>
3	6 kV pendant 1 min : pas de claquage <i>6 kV for 1 min : no breakdown</i>	Pas de claquage <i>No breakdown</i>
4	6 kV pendant 1 min : pas de claquage <i>6 kV for 1 min : no breakdown</i>	Pas de claquage <i>No breakdown</i>

5 Conclusion / Conclusion

Aucun claquage ou contournement ne s'est produit.

No breakdown occurred (tripping of voltage generator).

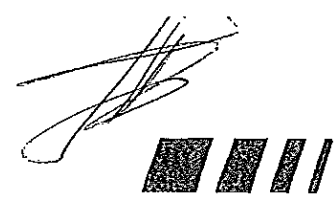
FIN DU RAPPORT D'ESSAI / END OF TEST REPORT



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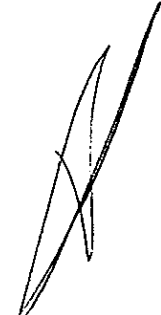


Laboratoire d'essais
LABEP



Rapport d'essai
Test report

: Essai de vieillissement climatique
: Climatic ageing test



Rapport d'essai n°	: 11 12 250	Test report n.	: 11 12 250
Constructeur	: SICAME	Product brand	: SICAME
Référence produit	: TTD2CCA	Product type	: TTD2CCA
Demandeur de l'essai	: SICAME S.A.	Test applied by	: SICAME S.A.
Date d'essai	: du 07 mars au 02 mai 2012	Date of the test	: 7 March to 2 May 2012
Date d'émission du rapport	: 04 mai 2012	Report emission date	: 4 May 2012

Essais réalisés suivant : NF EN 50483-4 (07/2009), § 8.1.5.2
Tests carried out in accordance with

Ce rapport comprend : 8 pages
This report contains

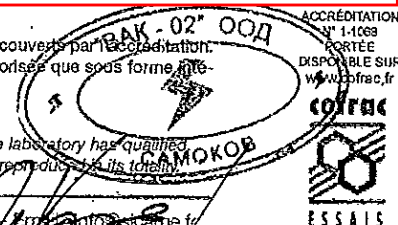
Conclusion : Les connecteurs à perforation d'isolant BT SICAME de type TTD2CCA soumis à essai satisfont aux exigences du § 8.1.5.2 de la norme NF EN 50483-4 (07/2009).
Pour déclarer la conformité, il n'a pas été tenu explicitement compte de l'incertitude associée au résultat.

Conclusion : The tested SICAME LV insulation piercing connectors TTD2CCA comply with the requirements of clause 8.1.5.2 of NF EN 50483-4 (July 2009) standard.
To give a ruling on the conformity, the uncertainty associated to the result is not implicitly involved

На основании чл. 2
от ЗЗЛД

L'accréditation de la section essais du COFRAC atteste de la compétence des laboratoires pour les seuls essais couverts par l'accréditation.
Ce rapport ne concerne que les produits référencés ci-dessus. La reproduction de ce rapport d'essais n'est autorisée que sous forme intégrale, avec l'accord de SICAME S.A.

Accreditation 1-1056, Scope on request.
The Cofrac testing section accreditation ensures the competence of the laboratory only for the tests for which the laboratory has qualified.
This report applies only to the products as listed above. With the authorization of SICAME S.A., this report may only be reproduced in its totality.



1 Echantillons soumis à essai / Samples under test

Type : Connecteur à perforation d'isolant (raccord temporaire)
Insulation piercing connector (temporary connector)

Désignation / Designation : TTD2CCA

Numéro de lot / Batch number : 11M307140
Echantillons suivant le plan E0680165
Samples in accordance with drawing n. E0680165

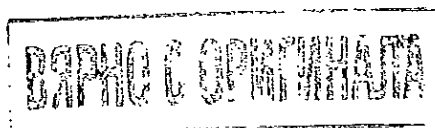
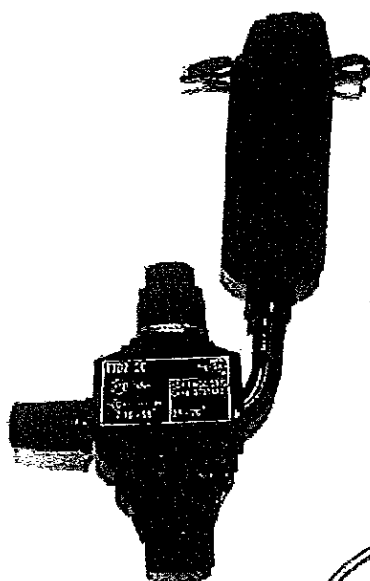
Couples de serrage Tightening torques	
Minimal	13 Nm
Nominal	14 Nm
Maximal	16 Nm

Plage de sections Cross-section range		
	Principal Main	Dérivé Tap
Min	16 mm ²	Satellite
Max	95 mm ²	

Classes du produit selon NF EN 50483-1 (§9.3) Classes of product in accordance with NF EN 50483-1 (§9.3)	
<input type="checkbox"/>	Classe A : raccords soumis aux cycles de vieillissement électrique et aux essais de court-circuit Class A : connectors subjected to heat cycles and short-circuit current tests
<input type="checkbox"/>	Classe B : raccords soumis seulement aux cycles de vieillissement électrique Class B : connectors subjected to heat cycles only
<input checked="" type="checkbox"/>	Classe 1 : raccords soumis à l'essai de tenue diélectrique dans l'eau Class 1 : connectors subjected to dielectric test in water
<input type="checkbox"/>	Classe 2 : raccords soumis à l'essai de tenue diélectrique dans l'air Class 2 : connectors subjected to dielectric test in air

Nombre d'échantillons / Number of samples : 4
Repérage / Identification : 1, 2, 3, 4

Date de réception au laboratoire : 14 décembre 2011
Reception date at the laboratory : 14 December 2011



Visa du responsable de l'essai
Visa supervisor of the test

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2 Caractéristiques du matériel / Equipment used during test

2.1 Appareillage utilisé / Equipment used

N° U.T.	Désignation / Designation	Caractéristiques / Characteristic
99 01 48	Thermomètre indicateur <i>Indicated thermometer</i>	Précision 2°C <i>Accuracy 2°C</i>
10 00 27	Clé à couple électronique <i>Electronic torque wrench</i>	De 1,5 à 30 Nm : Précision 4% <i>Range 1,5 to 30 Nm : Accuracy 4%</i>
91 02 69	Diélectrimètre BOUCHET (10 kV) <i>Dielectrimeter BOUCHET (10 kV)</i>	Précision 0,5mA et 200V <i>Accuracy 0,5mA and 200V</i>
03 02 56	Chronomètre <i>Stop watch</i>	Précision 1 s <i>Accuracy 1s</i>
97 02 02	Réglet étalon <i>Calibrated ruler</i>	Précision 0,5 mm <i>Accuracy 0,5 mm</i>
04 00 30	Thermomètre étanche <i>Watertight thermometer</i>	Précision 1°C <i>Accuracy 1°C</i>
99 00 41	Conductimètre <i>Conductimeter</i>	Précision 30 µS/cm <i>Accuracy 30µS/cm</i>
02 00 94	Wheather-ometer (ATLAS 1)	Conforme à la norme XP C 20-540 <i>Compliant with XP C 20-540 standard</i>

2.2 Câbles / Cables

N° Lot / Identification	07045		
Fourni par / Supplied by	<input checked="" type="checkbox"/> Laboratoire <i>Laboratory</i>	<input type="checkbox"/> Demandeur <i>Applicant</i>	
Norme / Standard	NF C 33-209		
Provenance / From	France		
Section / Cross section	16 mm ²		
Matériau de l'âme / Conductor material	<input type="checkbox"/> Cuivre <i>Copper</i>	<input checked="" type="checkbox"/> Aluminium	<input type="checkbox"/> Alliage d'aluminium <i>Aluminium alloy</i>
Type d'âme / Conductor type	<input type="checkbox"/> Massive <i>Solid</i>	<input checked="" type="checkbox"/> Câblée <i>Stranded</i>	<input type="checkbox"/> Rétreinte <i>Compacted</i>
	<input type="checkbox"/> Non rétreinte <i>Non compacted</i>	<input type="checkbox"/> Souple <i>Flexible</i>	
Forme d'âme / Conductor shape	<input checked="" type="checkbox"/> Ronde <i>Circular</i>	<input type="checkbox"/> Sectorale <i>Sector-shaped</i>	
Nombre de brins / Number of wires	7		
Ø sur âme / Ø on conductor	4,85 mm		
Matériau de l'isolant Insulation material	Polyéthylène réticulé type TIX-5 <i>Cross-linked polyethylene, TIX-5 type</i>		
Ø sur isolant / Ø on insulation	7,4 mm		
Conditionnement Conditioned on	1 heure à 120°C <i>1 hour at 120°C</i>		
Référence du câble HD626 / HD626 conductor reference	4 E-1		

ВЯРНО С ОПРИГНАЛАТА



Visa du responsable de l'essai
Visa supervisor of the test

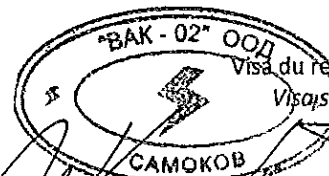
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N° Lot / Identification	05024		
Fourni par / Supplied by	<input type="checkbox"/> Laboratoire Laboratory	<input checked="" type="checkbox"/> Demandeur Applicant	
Norme / Standard	UNE 21-030-92		
Provenance / From	Espagne		
Section / Cross section	95 mm ²		
Matériau de l'âme / Conductor material	<input type="checkbox"/> Cuivre Copper	<input checked="" type="checkbox"/> Aluminium	<input type="checkbox"/> Alliage d'aluminium Aluminium alloy
Type d'âme / Conductor type	<input type="checkbox"/> Massive Solid	<input checked="" type="checkbox"/> Câblée Stranded	<input type="checkbox"/> Souple Flexible
	<input checked="" type="checkbox"/> Rétreinte Compacted	<input type="checkbox"/> Non rétreinte Non compacted	
Forme d'âme / Conductor shape	<input checked="" type="checkbox"/> Ronde Circular	<input type="checkbox"/> Sectorale Sector-shaped	
Nb de brins / N. of wires	15		
Ø sur âme / Ø conductor	11,5 mm		
Matériau de l'isolant Insulation material	Polyéthylène réticulé type TIX-3 Cross-linked polyethylene, TIX-3 type		
Ø sur isolant / Ø insulation	15,3 mm		
Conditionnement Conditioned on	1 heure à 120°C 1 hour at 120°C		
Référence du câble HD626 / HD626 conductor reference	6K-1		

ВАРНО С ОПИТИНАТА



Visa du responsable de l'essai
Visa supervisor of the test

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3 Essai / Test procedure

Les essais sur les raccords sont effectués selon les prescriptions du paragraphe 8.1.5.2 de la norme NF EN 50483-4 (07/2009). Les raccords de classe 1 sont testés dans l'eau.

Les raccords sont montés sur des conducteurs principaux des sections minimale et maximale et sur des conducteurs dérivés de la section minimale.

Les raccords sont serrés jusqu'à la valeur minimale du couple indiquée par le constructeur.

L'ensemble formé par le raccord et les conducteurs, maintenu d'une façon rigide et appropriée, est placé au fond d'un bac rempli d'eau sur 30 cm de hauteur mesurée au niveau de la partie supérieure du raccord, les extrémités des conducteurs émergeant suffisamment du bain pour éviter un contournement extérieur. La résistivité de l'eau ne doit pas excéder 200 Ωm (NF EN 50483-1 § 9.1.6 de 07/2009) et l'eau est à température ambiante.

Le générateur de tension utilisé est réglé pour déclencher sous un courant de fuite de (10.0 ± 0.5) mA (NF EN 50483-1 § 8.1.5 de 07/2009).

Après une durée d'immersion de 30 min, l'ensemble est soumis à un essai diélectrique sous une tension de 6 kV à fréquence industrielle (fréquence : 50 Hz) pendant 1 min. On effectue la montée progressive en tension à une vitesse d'environ 1 kV/s (NF EN 50483-1 § 9.1.7 de 07/2009).

Connectors are tested in accordance with NF EN 50483-4 § 8.1.5.2 (07/2009) standard. Class 1 connectors are tested in water.

Connectors are tightened up to the minimum torque indicated by the manufacturer. They are mounted on the smallest and largest cross-sections on the main core and on the smallest cross-section on the tap core. The assembly of connector and cores, maintained in a rigid and appropriate way, is placed at the bottom of a water tank. The water height is 30 cm measured from the upper part of the connector, and the cores are long enough out of the water to avoid flashover. The resistivity of the water is less than 200 Ωm (NF EN 50483-1 § 9.1.6 of 07/2009) and the water is at ambient temperature.

The voltage generator is tripping for a leakage current of (10,0 ± 0,5) mA (NF EN 50483-1 § 9.1.5 07/2009).

After 30 min under water, the voltage test is applied to the sample with a 6 kV a.c. voltage (frequency: 50 Hz) for 1 minute. The a.c. voltage is applied to a rate of approximately 1 kV/s (NF EN 50483-1 § 9.1.7 of 07/2009)

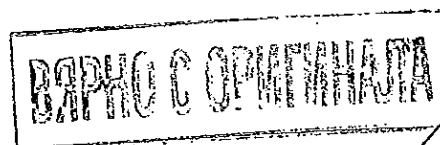
Les échantillons sont ensuite soumis à l'essai climatique suivant :

The samples are then submitted to the climatic ageing test following:

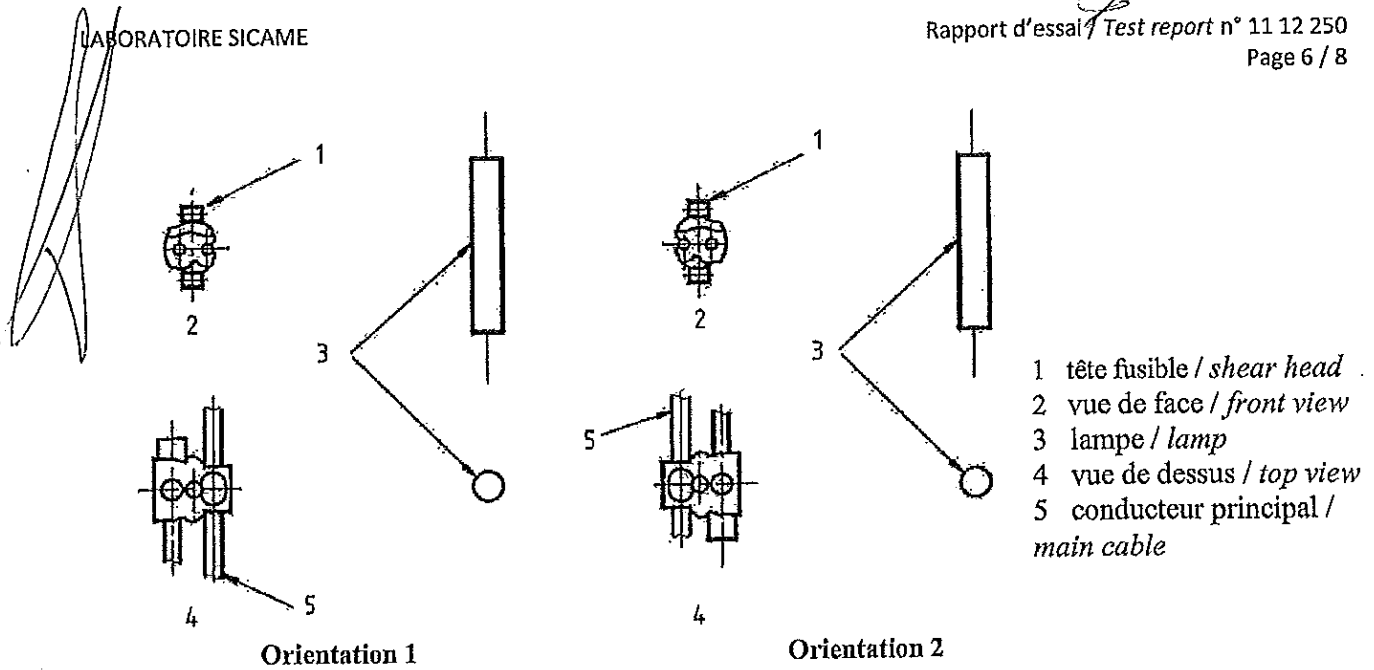
Méthodes d'essai selon NF EN 50483-6 (§ 8.5)		
<i>Test methods in accordance with NF EN 50483-6 (§ 8.5)</i>		
<input checked="" type="checkbox"/>	Méthode 1 <i>Method 1</i>	§ 8.5.1
<input type="checkbox"/>	Méthode 2 <i>Method 2</i>	§ 8.5.2

Les échantillons sont installés de façon telle que l'axe du conducteur principal soit dans un plan horizontal et la lampe dans un plan vertical. Ces deux plans se coupent au milieu de la lampe et au milieu des échantillons. Le conducteur principal est orthogonal au plan ainsi défini. La moitié des échantillons est installé suivant l'orientation 1, l'autre moitié suivant l'orientation 2.

The samples are installed so that the axis of the main core is in a horizontal plane and the lamp in a vertical plane. These two planes are intersect in the middle of the lamp and in the middle of the samples. The main core is orthogonal in the described vertical plane. Half of the samples is installed as per orientation 1, the other as per orientation 2.



Visa du responsable de l'essai
Visa supervisor of the test



Après les cycles de vieillissement climatique et après une période d'au moins 24h sans dépasser 72 h à l'atmosphère du laboratoire, les échantillons doivent satisfaire aux exigences des essais suivants.

- Les connecteurs à perforation d'isolant de classe 1 et de classe 2 doivent satisfaire aux exigences de l'essai de tenue diélectrique dans l'air, comme indiqué au 8.1.3.1.3.2.

- Pour les connecteurs à perforation d'isolant de classe 1, l'ensemble formé par le raccord et les conducteurs est ensuite retiré des billes métalliques, sans contrainte mécanique, et doit satisfaire aux exigences de l'essai de tenue diélectrique dans l'eau, comme indiqué au 8.1.3.1.3.1, mais avec une tension de 1 kV.

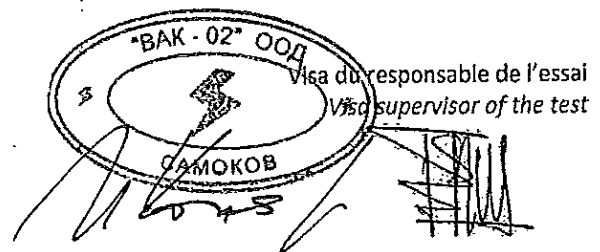
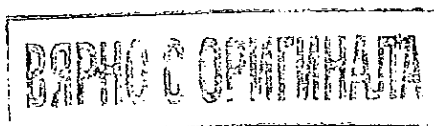
- Une inspection visuelle est réalisée afin de déterminer qu'il n'y a pas eu de dégradation des parties organiques pouvant nuire au bon fonctionnement de l'échantillon. Le marquage permettant l'identification des échantillons doit être lisible quand il est examiné avec une vue normale ou corrigée, sans grossissement.

After the climatic ageing cycles and after a period of at least 24 h but not exceeding 72 h at the laboratory atmosphere, the samples shall meet the requirements of the following tests.

- The IPC (insulation piercing connector) class 1 and class 2 shall meet the requirements of the dielectrical voltage test in air, as given in 8.1.3.1.3.2.

- For IPC Class 1 the assembly formed by the connector and the cores is then taken out of the metallic balls, without any mechanical stress, and shall meet the requirements of the dielectrical voltage test in water as given in 8.1.3.1.3.1, but with a voltage of 1 kV.

- Visual inspection is carried out to determine that there has been no degradation of the organic parts which could affect the normal function of the sample. The sample's identification marking shall be legible when examined with normal or corrected vision, without magnification.



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3.1 Conditions ambiantes / Ambient conditions

Les conditions ambiantes relevées lors de l'essai sont les suivantes :
Ambient conditions when performing the test are as follows:

	Exigences <i>Requirements</i>	Relevés <i>Results</i>
Température ambiante et humidité <i>Ambient temperature and humidity conditions</i>	15 °C ≤ T° ≤ 30 °C 25 % ≤ HR ≤ 75 %	21 °C 30 %HR
Température de l'eau <i>Water temperature</i>	Température ambiante <i>Ambient temperature</i>	20,4 °C
Résistivité de l'eau <i>Water resistivity</i>	≤ 200 Ωm	33,6 Ωm

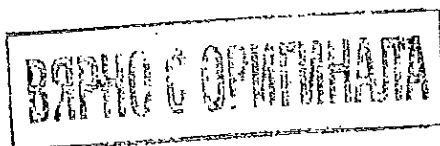
	Exigences <i>Requirements</i>	Relevés <i>Results</i>
Temps d'immersion <i>Immersion time</i>	30 min	30 min
Vitesse de montée en tension <i>Voltage increase rate</i>	≈ 1 kV/s	≈ 1 kV/s

3.2 Configuration des échantillons / Samples configuration

Connecteur n° <i>Connector n.</i>	Section/ Cross section (mm²)	
	Câble principal <i>Main cable</i>	Câble dérivé <i>Tap cable</i>
1	16	Satellite
2		
3	95	Satellite
4		

3.3 Relevés des couples de serrage / Tightening torque values

Echantillon n° <i>Sample n.</i>	Couples de serrage <i>Tightening torques</i>	(Nm)
1	13,08	
2	13,15	
3	13,20	
4	13,06	



visa du responsable de l'essai
visa supervisor of the test



4 Résultats / Results

	Exigences / requirements	Résultats / Results
6 kV pendant 1 minute dans l'eau avant essai climatique. <i>6 kV during 1 min before climatic ageing test.</i>	Pas de claquage <i>No breakdown</i>	Echantillon 1 : pas de claquage <i>Sample 1 : No breakdown</i> Echantillon 2 : pas de claquage <i>Sample 2 : No breakdown</i> Echantillon 3 : pas de claquage <i>Sample 3 : No breakdown</i> Echantillon 4 : pas de claquage <i>Sample 4 : No breakdown</i>
6 kV pendant 1 minute dans les billes métalliques après essai climatique. <i>6 kV during 1 min in metallic balls after climatic ageing test.</i>	Pas de claquage <i>No breakdown</i>	Echantillon 1 : pas de claquage <i>Sample 1 : No breakdown</i> Echantillon 2 : pas de claquage <i>Sample 2 : No breakdown</i> Echantillon 3 : pas de claquage <i>Sample 3 : No breakdown</i> Echantillon 4 : pas de claquage <i>Sample 4 : No breakdown</i>
1 kV pendant 1 minute dans l'eau après essai climatique. <i>1 kV during 1 min in water after climatic ageing test.</i>	Pas de claquage <i>No breakdown</i>	Echantillon 1 : pas de claquage <i>Sample 1 : No breakdown</i> Echantillon 2 : pas de claquage <i>Sample 2 : No breakdown</i> Echantillon 3 : pas de claquage <i>Sample 3 : No breakdown</i> Echantillon 4 : pas de claquage <i>Sample 4 : No breakdown.</i>

5 Conclusion / Conclusion

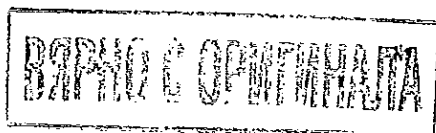
Aucun claquage ou contournement ne s'est produit.

Le marquage permettant l'identification des échantillons est lisible quand il est examiné avec une vue normale ou corrigée, sans grossissement.

No breakdown occurred (tripping of voltage generator).

The marking allowing the samples identification is legible when examined with normal or corrected vision, without magnification.

FIN DU RAPPORT D'ESSAI / END OF TEST REPORT



Visa du responsable de l'essai
Visa supervisor of the test

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Laboratoire d'essais
LABEP

SICAME GROUP



Rapport d'essai
Test report

: Essais de fonctionnement des têtes fusibles
: **Shear head function test**

Rapport d'essai n°	: 11 12 210	Test report n.	: 11 12 210
Constructeur	: SICAME	Product brand	: SICAME
Référence produit	: TTD2CCA	Product type	: TTD2CCA
Demandeur de l'essai	: SICAME S.A.	Test applied by	: SICAME S.A.
Date d'essai	: 2 février 2012	Date of the test	: 2 February 2012
Date d'émission du rapport	: 7 février 2012	Report emission date	: 7 February 2012

Essais réalisés suivant : NF EN 50483-4 (07/2009), § 8.1.2.4
Tests carried out in accordance with

Ce rapport comprend : 7 pages
This report contains

Conclusion : Les connecteurs à perforation d'isoant SICAME de type TTD2CCA soumis à essai satisfont aux exigences du § 8.1.2.4 de la norme NF EN 50483-4 (07/2009).
Pour déclarer la conformité, il n'a pas été tenu explicitement compte de l'incertitude associée au résultat.

Conclusion : *The tested SICAME insulated piercing connectors TTD2CCA comply with the requirements of clause 8.1.2.4 of NF EN 50483-4 (July 2009) standard. To give a ruling on the conformity, the uncertainty associated to the result is not implicitly involved*

На основании чл. 2
от 33ЛД

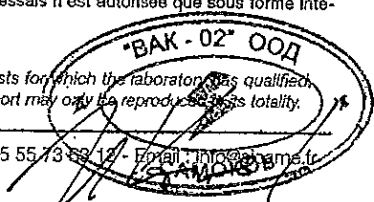
L'accréditation de la section essais du COFRAC atteste de la compétence des laboratoires pour les seuls essais couverts par l'accréditation. Ce rapport ne concerne que les produits référencés ci-dessus. La reproduction de ce rapport d'essais n'est autorisée que sous forme intégrale, avec l'accord de SICAME S.A.



D 0194 07

Accreditation 1-1068. Scope on request.
The Cofrac testing section accreditation ensures the competence of the Laboratory staff for the tests for which the laboratory has qualified. This report applies only to the products as listed above. With the authorization of SICAME S.A., this report may only be reproduced in its totality.

B.P. N° 1 - 19231 POMPADOUR, FRANCE - Tel (33) 05 55 73 89 00 - Fax (33) 05 55 73 89 12 - Email: info@sicame.fr



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1 Echantillons soumis à essai / Samples under test

Type : Connecteur à perforation d'isolant (raccord temporaire)
Insulation piercing connector (temporary connector)

Désignation / Designation : TTD2CCA

Fabricant / Manufacturer : SICAME

Numéro de lot / Batch number : 11M307140
Echantillons conformes au plan E0680165
Samples compliant with drawing n. E0680165

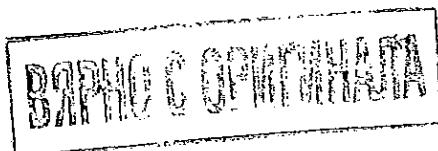
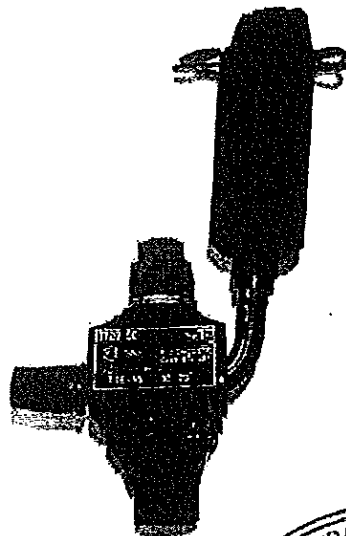
Couples de serrage <i>Tightening torques</i>			
T°C	-10°C	20°C	50°C
Minimal	16 Nm	13 Nm	11,5 Nm
Nominal	18 Nm	14 Nm	13 Nm
Maximal	19 Nm	16 Nm	14,5 Nm

Plage de sections <i>Cross-section range</i>		
	Principal <i>Main</i>	Dérivé <i>Tap</i>
Min	16 mm ²	Satellite
Max	95 mm ²	

Classes du produit selon NF EN 50483-1 (§9.3) <i>Classes of product in accordance with NF EN 50483-1 (§9.3)</i>	
<input type="checkbox"/>	Classe A : raccords soumis aux cycles de vieillissement électrique et aux essais de court-circuit <i>Class A : connectors subjected to electrical ageing cycles and short-circuits</i>
<input type="checkbox"/>	Classe B : raccords soumis seulement aux cycles de vieillissement électrique <i>Class B : connectors subjected only to electrical ageing cycles</i>
<input checked="" type="checkbox"/>	Classe 1 : raccords soumis à l'essai de tenue diélectrique dans l'eau <i>Class 1 : connectors subjected to a.c. voltage withstand test in water</i>
<input type="checkbox"/>	Classe 2 : raccords soumis à l'essai de tenue diélectrique dans l'air <i>Class 2 : connectors subjected to a.c. voltage withstand test in air</i>

Nombre d'échantillons / Number of samples : 24
Repérage / Identification : 1 à 24 / 1 to 24

Date de réception au laboratoire : 14 décembre 2011
Reception date at the laboratory : 14 December 2011



Visa du responsable de l'essai
Visa supervisor of the test

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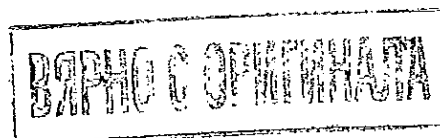
2. Caractéristiques du matériel / Equipment used during test

2.1 Appareillage utilisé / Equipment used

N° U.T.	Désignation / Designation	Caractéristique / Characteristic
10 00 27	Clé à couple électronique <i>Electronic torque wrench</i>	De 1,5 à 30 Nm : Précision 4% <i>Range 1,5 to 30 Nm ; Accuracy 4%</i>
10 03 21	Chambre froide <i>Low temperature chamber</i>	Précision 1°C <i>Accuracy 1°C</i>
02 01 76	Thermomètre indicateur <i>Indicating thermometer</i>	Précision ± 2°C <i>Accuracy ± 2°C</i>
89 01 12	Enceinte <i>Enclose</i>	Précision ± 2°C <i>Accuracy ± 2°C</i>

2.2 Câbles / Cables

N° Lot / Identification	07045		
Fourni par / Supplied by	<input checked="" type="checkbox"/> Laboratoire <i>Laboratory</i>	<input type="checkbox"/> Demandeur <i>Applicant</i>	
Norme / Standard	NF C 33-209		
Provenance / From	France		
Section / Cross section	16 mm ²		
Matériau de l'âme / Conductor material	<input type="checkbox"/> Cuivre <i>Copper</i>	<input checked="" type="checkbox"/> Aluminium	<input type="checkbox"/> Alliage d'aluminium <i>Aluminium alloy</i>
Type d'âme / Conductor type	<input type="checkbox"/> Massive <i>Solid</i>	<input checked="" type="checkbox"/> Câblée <i>Stranded</i>	
	<input type="checkbox"/> Rétreinte <i>Compacted</i>	<input checked="" type="checkbox"/> Non rétreinte <i>Non compacted</i>	<input type="checkbox"/> Souple <i>Flexible</i>
Forme d'âme / Conductor shape	<input checked="" type="checkbox"/> Ronde <i>Circular</i>	<input type="checkbox"/> Sectorale <i>Sector-shaped</i>	
Nombre de brins / Number of wires	7		
Ø sur âme / Ø on conductor	4,85 mm		
Matériau de l'isolant Insulation material	Polyéthylène réticulé type TIX-5 <i>Cross-linked polyethylene, TIX-5 type</i>		
Ø sur isolant / Ø on insulation	7,4 mm		
Conditionnement Conditioned on	1 heure à 120°C <i>1 hour at 120°C</i>		
Référence du câble HD626 / HD626 conductor reference	4 E-1		



Visa du responsable de l'essai
Visa supervisor of the test

N° Lot / Identification	05024		
Fourni par / Supplied by	<input type="checkbox"/> Laboratoire Laboratory	<input checked="" type="checkbox"/> Demandeur Applicant	
Norme / Standard	UNE 21-030-92		
Provenance / From	Espagne		
Section / Cross section	95 mm ²		
Matériau de l'âme / Conductor material	<input type="checkbox"/> Cuivre Copper	<input checked="" type="checkbox"/> Aluminium	<input type="checkbox"/> Alliage d'aluminium Aluminium alloy
Type d'âme / Conductor type	<input type="checkbox"/> Massive Solid	<input checked="" type="checkbox"/> Câblée Stranded	
	<input checked="" type="checkbox"/> Rétreinte Compacted	<input type="checkbox"/> Non rétreinte Non compacted	<input type="checkbox"/> Souple Flexible
Forme d'âme / Conductor shape	<input checked="" type="checkbox"/> Ronde Circular	<input type="checkbox"/> Sectorale Sector-shaped	
Nb de brins / N. of wires	15		
Ø sur âme / Ø conductor	11,5 mm		
Matériau de l'isolant Insulation material	Polyéthylène réticulé type TIX-3 Cross-linked polyethylene, TIX-3 type		
Ø sur isolant / Ø insulation	15,3 mm		
Conditionnement Conditioned on	1 heure à 120°C 1 hour at 120°C		
Référence du câble HD626 / HD626 conductor reference	6K-1		

ВАРНСКО ОРЪНТОВАНАТА



Visa du responsable de l'essai
Visa supervisor of the test

3 Méthode / Method

Les essais sur les raccords sont effectués selon les prescriptions du paragraphe 8.1.2.4 de la norme NF EN 50483-4 (07/2009).

Connectors are tested according to NF EN 50483-4 § 8.1.2.4 (07/2009) standard.

Six échantillons sont testés pour chacune des températures suivantes :

- la température minimale est de $(-10 \pm 3) ^\circ\text{C}$;
- la température maximale est de $(50 \pm 3) ^\circ\text{C}$.

Six samples are tested at each of the following temperatures.

- *The minimum temperature is $(-10 \pm 3) ^\circ\text{C}$.*
- *The maximum temperature is $(50 \pm 3) ^\circ\text{C}$.*

Les échantillons sont testés pour les combinaisons de sections suivantes :

The samples are tested in either of the following cross section combinations :

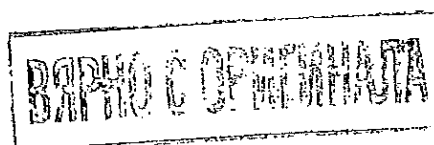
Principal / Main	Dérivé / Branch
Min.	Min.
Max.	Max.

Les raccords montés sont placés dans une enceinte à température contrôlée jusqu'à ce qu'ils atteignent la température d'essai. La température est maintenue pendant au moins 15 minutes. La tête fusible est ensuite serrée, conformément aux instructions de montage du fournisseur, jusqu'à rupture de la tête. Ce couple est enregistré. L'essai est répété pour les trois échantillons de chacune des températures et des combinaisons de sections spécifiées.

The connector assemblies are placed in a temperature controlled environment until they reach the test temperature. The temperature is maintained for a minimum of 15 minutes. The shear head is then tightened, in accordance with the manufacturer's installation instructions, until the head shears. This torque is recorded. The test is repeated for the three samples at each of the specified temperatures and cross section combination.

Pour chacune des températures d'essai et des combinaisons de sections, le couple auquel la tête fusible casse, doit être dans les tolérances du couple spécifié par le fournisseur.

For each of the test temperatures and cross section combination, the torque at which the shear head shears, shall be within the tolerances of the manufacturer's specified torque range.



Visa du responsable de l'essai
CAMONIA supervisor of the test

3.1 Conditions ambiantes / Ambient conditions

Les conditions ambiantes relevées lors de l'essai sont les suivantes :
Ambient conditions when performing the test are as follows :

	Exigences Requirements	Relevés Results
Température ambiante et humidité Ambient temperature and humidity conditions	15 °C ≤ T° ≤ 30 °C 25 % ≤ HR ≤ 75 %	22 °C 34 %HR
Température de la chambre froide Low temperature chamber	(- 10 ± 3)°C	-10,8 °C
Température de l'enceinte Enclose temperature	(50 ± 3)°C	50,6 °C

	Relevés Results
Temps de conditionnement en chambre froide Conditioning time in low temperature chamber	1 h 05
Temps de conditionnement dans l'enceinte Conditioning time in enclose	1 h 15

3.2 Configuration des échantillons / Samples configuration

Echantillon n° Sample n.	Température de conditionnement Temperature controlled (°C)	Section/ Cross section (mm²)	
		Câble principal Main cable	Câble dérivé Tap cable
1	-10 ± 3	16	Satellite
2			
3			
4			
5			
6			
7	95	Satellite	
8			
9			
10			
11			
12			
13	50 ± 3	16	Satellite
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

ВАРХО С ОПИТИВАЊА

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Visa du responsable de l'essai
Visa supervisor of the test
CAMOKOB

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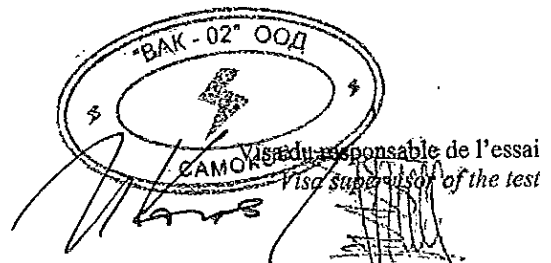
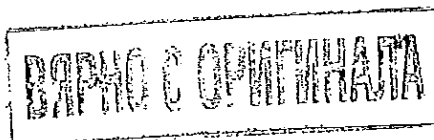
3.3 Relevés des ruptures de la tête fusible / Results of breaking torques


Echantillon n° Sample n.	Couples de rupture fusible (Nm) Shear head breaking torques
1	16,77
2	17,40
3	17,59
4	18,43
5	17,05
6	17,23
7	17,59
8	16,79
9	18,17
10	18,18
11	17,03
12	17,04
13	14,15
14	13,98
15	13,33
16	13,88
17	13,96
18	13,71
19	14,37
20	14,38
21	14,39
22	14,27
23	14,40
24	14,38

4 Conclusion / Conclusion

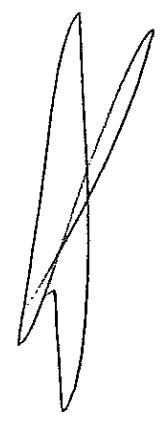
Le couple auquel la tête fusible casse, est dans les tolérances du couple spécifié par le fournisseur.
The torque at which the shear head shears is within the tolerances of the manufacturer's specified torque range.

FIN DU RAPPORT D'ESSAI / END OF TEST REPORT





**СПИСЪК НА ОТДЕЛНИТЕ ИЗПИТВАНИЯ НА ИЗОЛИРАНА КЛЕМА ЗА
ПРЕНОСИМ ЗАЗЕМИТЕЛ ТИП TTD 2 ССА**

- 
1. № на тест: 1112200 - Изпитване на затягането на болта;
 2. № на тест: 1112190 – Тест за механично увреждане на главния проводник;
 3. № на тест: 1112240 - Тест за инсталиране при ниска температура;
 4. № на тест: 1112220 - Тест за въздействие при ниска температура;
 5. № на тест: 1112230 - Диелектричен тест под напрежение;
 6. № на тест: 1112250 - Тест за старене под въздействие на климатични условия;
 7. № на тест: 1112210 - Тест за срязване на главата на болта.

На основание чл. 2
от ЗЗЛД

Съставил:



860



sicame

Laboratoire d'essais

Direction études et recherches

TEST REPORT : DIELECTRIC WATERTIGHT TEST

PRODUCT: Low voltage insulating piercing connectors
(Connectors are used for temporary power take off or a short circuiting)

Report number	: 9306180
Product brand	: SICAME
Product type	: TTD 3 CCA
Project n°	: E.0680120
Production lot number	: 93S5731

Demandeur of the test: DER SICAME
 Starting date of the test : 11/06/1993
 Report emission date : 27/03/1997
 According to standard : C 33-020 (DECEMBER 92)
 This report contains : 3 Pages - Annexe(s)

Conclusion : The low voltage insulation piercing connectors by SICAME type TTD3CCA conforms to the standard C 33-020 December 92.

На основании чл. 2
от 33ЛД

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SICAME DER	DIELECTRIC TEST EQUIPMENT ACCORDING TO SPECIFICATION: NF C 33-020	SUP ER 1160 INDICE A
---------------	--	-------------------------

Test number : 9306180
Product brand : SICAME
Product type : TTD3CCA

A - Computer equipment

IBM PS2 (Inv N°: 88 93 06) Hard disk 115 MB
Analog/Digital interface card
Digital/Analog interface card
Disk Operating System: DOS 6.1 IBM

IBM 4029 020 (Inv N°: 92 03 30) Laser printer

B - Equipment for Dielectric test

Dielectric unit (Inv N°: 91 02 82)

C - General Equipment

Digital vernier (Inv N°: 93 06 07) MITUTOYO

Electronic Torque wrench (Inv N°: 92 03 31) POWELL DUFFRYN
Accuracy 1%

Calibrated Ruler (Inv N°: 95 01 75) ROCH

Stopwatch (Inv N°: 92 02 82) HANHART

На основании чл. 2
от 33ЛД

SICAME DER	DIELECTRIC AND WATERTIGHT TEST ACCORDING TO SPECIFICATION : NF C 33-020	SUP ER 560 INDICE A
---------------	--	------------------------

Test number : 9306180 Date: 11/06/1993 Ambient Temperature : 23.2 °C
 Product brand : SICAME Humidity : 48 %
 Product type : TTD3CCA Fitted with Shear Heads : F1314

A- Test Procedure

The conductors are bend to the correct shape prior to fitting the connectors. The bolt of the connector is tightened to the minimum torque value as specified by the manufacturer.

The assembly is placed in a container of water, the water level must be 30 cm above the uppermost part of the connector. After the assembly has been immersed for 30 minutes, the assembly is subject to the dielectric test. The potential difference applied between the water and the conductor being 6 kV - 50 Hz, for the duration of 1 minute.

The potential difference is applied at a rate of 1 kV/s. The maximum leakage current for the interruption (triggering of circuit breaker) of the HT supply is 10 mA.

B- Readings

CONNECTOR N°	Cable sizes used (mm ²)		Torque Values (Nm)		
	Main	Tap	Main	Tap 1	Tap 2
1	54.6 Aln	PIN	13	-	-
2	54.6 Aln	PIN	13	-	-
3	150 Alu	PIN	13	-	-
4	150 Alu	PIN	13	-	-
N° CONNECTEUR	6kV/1mm After 30 min in water	Tripping value with I=10mA (KV)	OBSERVATIONS		
1	OK	>10	CONFORM		
2	OK	>10	CONFORM		
3	OK	>10	CONFORM		
4	OK	>10	CONFORM		

General comment:

На основании чл. 2
от 33ЛД

EXAMINER'S SIGNATURE

11/6/93



sicame

Laboratoire d'essais

Direction études et recherches

TEST REPORT : Temperature rise and overcurrent test according

PRODUCT: Low voltage insulating piercing connectors
(Connectors are used for temporary power
take off or a short circuiting)

Report number	: 9306170
Product brand	: SICAME
Product type	: TTD3CCA
Project n°	: E.0680120
Production lot number	: 93S5731

Demander of the test: DER SICAME

Starting date of the test : 11/06/1993

Report emission date : 27/03/1997

According to standard : C 33-020 (DECEMBER 92)

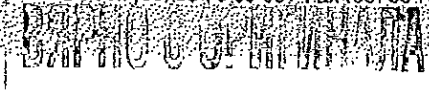
This report contains : 3 Pages - Annexe(s)

Conclusion

: The low voltage insulation piercing
connectors by SICAME type TTD3CCA conforms
to the standard C 33-020 December 92.

На основании чл. 2
от 33ЛД

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SICAME DER	EQUIPEMENT USED DURING RISE AND OVERCURRENT TEST ACCORDING STANDARD : C 33-020	SUP ER 1130 INDEX A
---------------	--	------------------------

Test number : 9306170
Product brand : SICAME
Product type : TTD3CCA

A - Computer

IBM PS2 N'UT : 88 93 06 Hard disc 115 MEGABYTES
Analogue / digital card
Digital / Analogue card
DOS 6.1 IBM System used

IBM 4029 020 N'UT : 92 03 30 laser printer

B - Electrical ageing machines

N'1 N'UT : 86 01 38

Transformer 1200A/7V or 1200A/10V thyristor units used for the primary transformers. Thermal regulation by eurotherm. 0.5 % indicator accuracy of the full scale at the point of prescription. Program planner cycles : 1 second. Minimum accuracy : 1 min programming. Stabilised continuous current source - SAEME - 0 to 30 Amps measured by shunt 3.3 Megohms. Current adaptor except n° 3

C - Electrical and thermal measurements machines

Scanner N'2 N'UT : 91 03 31

Temperature scanners - COLE PARMER -
- 12 tracks. Constant copper thermocouples (type T). Scale used : - 200 to + 300 °C, 1 °C accuracy.

Numeric calibrator N'UT : 88 05 14 AOIP JN 5303B (tension drop)

Buzzer SICAME N'UT : 92 04 20

Short-circuit machine N'UT : 79 00 59 MEROT SODEX
Intensity transformer report : 25000/5 A
Precision rating : 15 VA Class 0.5
Secondary monophasic transformer : 40 V / 20000 A RMS during 1 s.

D - Other materials

Digital slide caliper ruler N' UT : 93 06 07 MITUTOYO

Electronic torque wrench N' UT : 92 03 31 POWELL DUFFRYN
Accuracy 1%

На основании чл. 2
от 33ЛД

SICAME R & D DEPT	TEMPERATURE RISE AND OVERCURRENT TEST ACCORDING TO STANDARD : C 33-020	SUP ER 760 INDICE A
----------------------	---	------------------------

Test number : 9306170 Date: 11/06/1993 Ambient temperature : 23.4 °C
 Product Brand : SICAME Humidity : 47 %
 Product type : TTD3CCA Mounted with : F1314
 Shearhead

A - TESTING METHOD

Four connectors are mounted on phase cables of maximum core area. They are tightened at the minimum torque value indicated by the manufacturer. The connectors are linked together two by two by a 25 mm² copper braid with, at one end, a junction socket compatible with the connector pin. Each connector has a thermocouple at the closest place to the current way inside the connector. Each connector's pin has a thermocouple placed at the bayonet lock.

PRELIMINARY TEMPERATURE RISE :

An AC current of 100 ± 2 A is applied till all components of the test loop have reached a stable temperature. Temperature of each junction is checked and noted as T1; temperature of each pin is checked and noted as T2.

OVERCURRENT TEST :

As soon as the temperature of the test loop is down to ambient temperature, a serial of four overcurrent loads of 4 kA RMS is applied during one second.

FINAL TEMPERATURE RISE :

After these overcurrent loads, an AC current of 100 ± 2 A is applied to the loop till all components of the loop have reached a stable temperature. Temperature of each junction is checked and noted as T3; temperature of each pin is checked and noted as T4.

B - RESULTS

	JUNCTION 1		JUNCTION 2		JUNCTION 3		JUNCTION 4	
	TTD	Pin	TTD	Pin	TTD	Pin	TTD	Pin
Temp. of preliminary heat	T1 44.4	T2 68.1	T1 44.7	T2 70.3	T1 42.8	T2 72.7	T1 42.7	T2 68.1
4 overcurrent loads 4 kA/1s	1 °C.C----->3449 A/1.06s 2 °C.C----->4226 A/1.08s 3 °C.C----->4287 A/1.04s 4 °C.C----->4251 A/1.04s							
temp. of final heating	T3 45.3	T4 73.1	T3 45.8	T4 75.6	T3 43.8	T4 75.6	T3 44.2	T4 72.9
Requirements T3-T1 < 10 °C T4-T2 < 10 °C	0.9	5.0	1.1	6.3	1.0	2.9	1.5	4.8

На основании чл. 2
от ЗЗЛД

**СПИСЪК НА ОТДЕЛНИТЕ ИЗПИТВАНЯ НА ИЗОЛИРАНА КЛЕМА ЗА
ПРЕНОСИМ ЗАЗЕМИТЕЛ ТИП TTD 3 ССА**

1. № на тест: 9306180 - Диелектричен тест за водонепропускливост;
2. № на тест: 9306170 – Тест за пренапрежение и късо съединение и изпитване при повишена температура.

Съставил:

На основание чл. 2
от ЗЗЛД



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sicame

Laboratoire d'essais
Direction Etudes et Recherches

Test report	: Tensile test on attachment lugs and service dead-end clamps
Test number	: 02 09 160
Product brand	: SICAME
Product type	: PP 63 F 27 and PC 63 F 27

Demandeur of the test : DER

Starting date of the test : 12/09/02

Report emission date :

According to standard : NF C 33-042 § 2.3 (february 99)

This report contains : 3 pages and 1 annex

Conclusion : The SICAME attachment lugs PP 63 F 27 and PC 63 F 27 conform to the requirements of NF C 33-042 § 2.3 (february 99) standard.

This is an English translation. The original French report test is the only reference version

На основание чл. 2
от ЗЗЛД

Accreditation 1-1088, Scope on request.
The Cofrac testing section accreditation ensures the competence of the Laboratory staff for the tests for which the Laboratory has qualified.
This report applies only to the products as listed above. With the authorization of Sicame S.A., this report may only be reproduced in its totality.

PORTÉE COMMUNIQUEE SUR DEMANDE
cofrac
"BAK - 02" OUI
ESSAIS
CAMOKOV

B.P. N° 1 - 19231 POMPADOUR - CEDEX - FRANCE - Tél (33) 05 55 73 89 00 - Fax (33) 05 55 73 83 12 - Email info@sicame.fr

ВАРНО С СЕРТИФИКАТА

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1 Equipment used during test.

Equipment used :

N° U.T.	Designation	Characteristic
94 03 10	Traction bench 3 tons	Class I

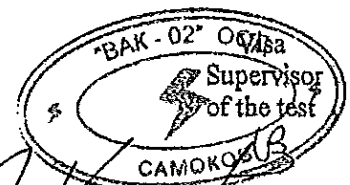
Cables :

Section	2 x 16	4 x 25
Nature	Aluminium	Aluminium
Standard	NF C 33-209	/
From	France	Poland
Identification n°	5008	5133
Conditioned on	10/01/2001 (1h00 at 120°C)	/

2 Product tested.

Designation : PP 63 F 27 and PC 63 F 27
 Number : 2
 Project number : PP 63 F 27 : E 0320200
 PC 63 F 27 : E 1080300
 Batch number : PP 63 F 27 : 02M115180
 PC 63 F 27 : 02M158320
 Identification : 1 and 2 with 2 x 16 mm² cable.
 3 and 4 with 4 x 25 mm² cable.
 Reception date : at the laboratory on the 12/09/2002.

ВЯРНО С ОПРЕДЕЛЕНИЕТО



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3 Test procedure

Lugs and clamps are tested according to NF C 33-042 § 2.3 (february 99).

An anchoring clamp is installed at 50 cm from the end of a 2 m long minimum overhead bundle with a 2x16 mm² cross-section. It is fitted the same way as it is done on the support ; the same test is carried out on a 4x25 mm² overhead bundle.

An appropriate tensile machine is installed at the other end.

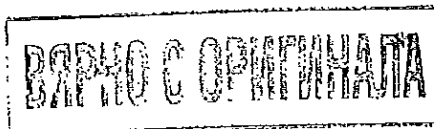
An increasing strength T_n is applied to the assembly up to 1500 N, within +/- 5 %. The strength is maintained at this value for 10 min then gradually increased to the nominal value $T_r=2000$ N, then released.

4 Results

	Standard requirements	Results
Ambient temperature and humidity conditions	Between 15 and 35°C Between 25 % and 75 % HR	22°C 40 % HR
Rate of the tensile (N/min)	Between 500 and 1000	800
Strength value maintained for 10 min (N)	1500 ± 5%	Sample 1 : Min 1490,54 – Max 1508,88 Sample 2 : Min 1489,10 – Max 1502,83 Sample 3 : Min 1485,67 – Max 1505,12 Sample 4 : Min 1490,25 – Max 103,98
Strength value applied without breakdown (N)	2000	Sample 1 : 1999,0 Sample 2 : 1997,0 Sample 3 : 1994,0 Sample 4 : 1994,0

5 Requirements

No permanent slippage, nor breakdown of any part of the lug or the clamp are observed.



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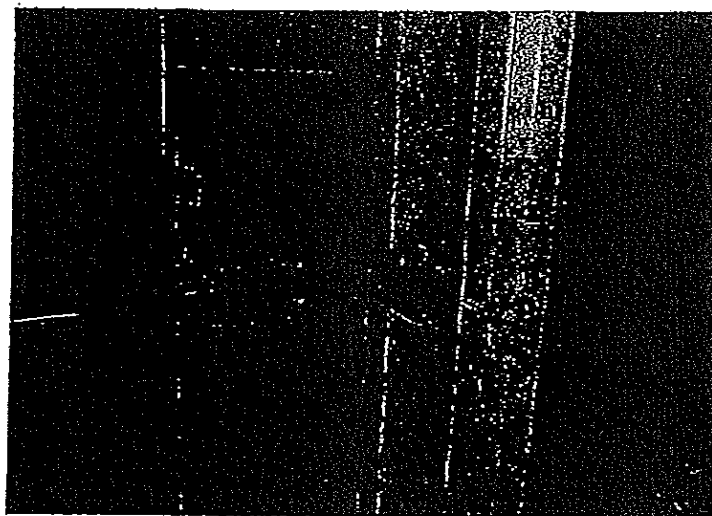
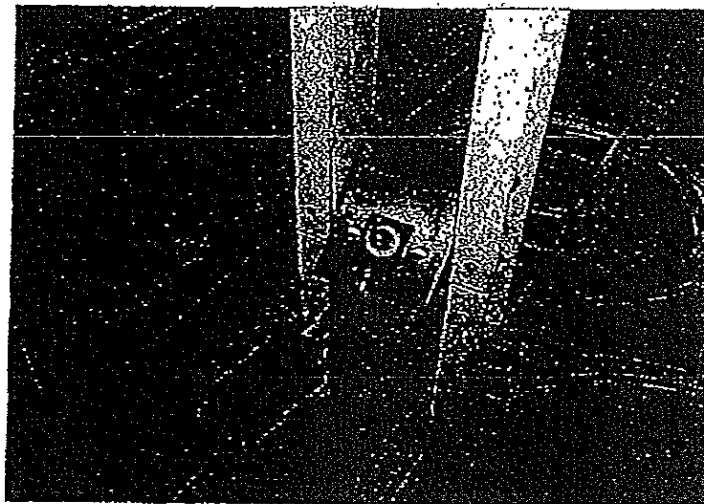
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SICAME LABORATORY

PP 63 F27 and PC 63 F27

Test n°: 0209160
Annex 1

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ВЪРНО С ОРИГИНАЛА

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САМОВ

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Laboratoire d'essais
Direction études et recherches

TEST REPORT : DIELECTRIC AND MECHANICAL

PRODUCT: SERVICE ANCHOR CLAMP

Report number	:	9401200
Product brand	:	SICAME
Product type	:	PC63 F27
Project number	:	E 1080300
Production lot numb:	:	93M201130

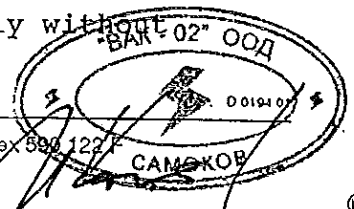
Demander of the test : SICAME R&D DPT
 Starting date of the test : 27/01/1994
 Report emission date : 20/09/1994 (ENGLISH TRANSLATION)
 According to standard : PROJECT NFC 33-042 OCTOBER 93
 This report contains : 4 Pages - Annexes

Conclusion : The SICAME service anchoring clamps
 type PC63 F27 conforms to NF C 33-042
 standard PROJECT OF Octobre 93

На основание чл. 2
от 33ЛД

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РЕПУБЛИКА СЕРБИЈА
СТАНДАРДНА ОРГАНИЗАЦИЈА



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SICAME R&D DPT	EQUIPMENT USED DURING DIELECTRICAL AND MECHANICAL TESTS STANDARD : NF C 33-042 PROJECT (10/93)	SUP ER 1380 INDICE A
-------------------	--	-------------------------

Test number : 9401200
 Product brand : SICAME
 Product type : PC63 F27

A - COMPUTER

HP 9826 N° UT : 88 91 93
 HP 3497A N° UT : 88 05 58 Data recording
 HP 7470 N° UT : 88 91 90 Plotter
 IBM PS2 N° UT : 88 93 06 Hard disc 112 precabytes
 Analog/digital card
 Digital/analog card
 DOS 6.1 system used
 IBM 4029 020 N° UT : 92 03 30 Laser printer

B - EQUIPMENT FOR MECHANICAL TEST

HP 3456 N° UT : 88 05 17 Voltmeter
 Traction bench N° UT : 89 01 34 10 tons HP 9826 driven
 Load cell N° UT : 93 00 80 FGP INSTRUMENTATION
 Power supply Fontaine N° UT : 92 02 79 2 * 40 V continuous

C - EQUIPEMENT FOR DIELECTRIC TEST

~~Dielectric meter BOUCHET N° UT : 91 02 69~~

D - OTHER EQUIPMENTS

Digital caliper N° UT : 93 06 07 MITUTOYO

На основание чл. 2
от ЗЗЛД

ВЯРНО С ОПИТИНАТА

CAMOKOB

882

SICAME	DIELECTRIC TEST	SUP ER 1370
R&D DPT	ACCORDING TO DRAFT STANDARD NF C 33-042 (10/93)	INDICE A

Test number : 9401200 Date:27/01/94 Room temperature : 22.3°C
 Product brand : SICAME Humidity : 38 %
 Product type : PC63 F27

A - TEST PROCEDURE

The test is carried out with conductive barrels whose emerging ends are insulated and that are fitted into every places for the cables of the bundle.

The length of the barrels is such that they protrude by 2 cm at each end of the tightening pieces of the clamp.

The diameter of the barrels "d" is determined by the average position of the different parts of the clamp, while a strength of 600 N is applied to the maximum and minimum cross section area of allowed bundle.

The conductive part of the clamp is earthed, and an industrial AC voltage is applied to the barrels at a rate of 1 KV/s up to 6 KV. This voltage level is maintained for 1 min.

B - RESULTS

DIAMETER OF THE CONDUCTIVE BARREL : 7.96 mm

CLAMP N°	MECHANICAL LOAD APPLIED (N)	6 KV/1 mn IN THE AIR	COMMENTS
1	600	SATISFACTORY	-
2	600	SATISFACTORY	-
3	600	SATISFACTORY	-
4	600	SATISFACTORY	-

General comments :

These clamps are taken for the mechanical test

На основании чл. 2
от 33ЛД

ВЫПОЛНЕНО С УДАЧЕЙ

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SICAME	MECHANICAL STRENGTH TEST OF THE CLAMPS	SUP ER 970
R&D DPT	ACCORDING TO STANDARD NF C 33-042 (10/93)	INDICE B

Test number : 9401200 Date:27/01/94 Room temperature : 22.3°C
 Product brand : SICAME Humidity : 38 %
 Product type : PC63 F27

A - TEST PROCEDURE

An anchoring device is installed at 50 cm from the end of a 2 X 16 mm² bundle which is at least 2 meters length.

It is installed by an equivalent means usually used for its fixation on the support.

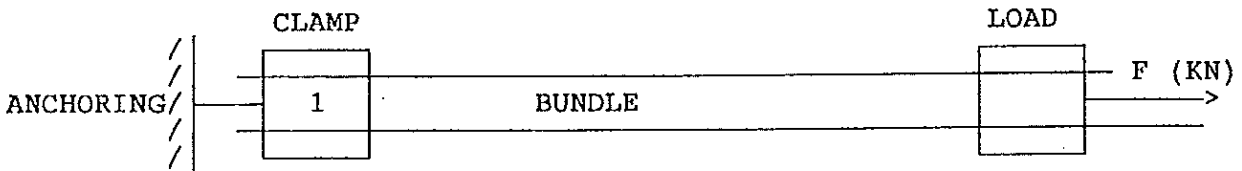
The same assembly is set up for a 4 X 25 mm² bundle.

At the other end of the cable, an appropriate traction device is set up.

An increasing load is applied up to 1500 N ± 2%.

The load value is maintained during 10 minutes. Then, the load increase is repeated up to the value fixed for this material : 2000 N, then the load is released.

B - ASSEMBLING



C - RESULTS

CLAMP N°	CORE*AREA	MECHANICAL STRENGTH REQUIRED 10 mn (KN)	RESULTS	INCREASE UP TO 2000 N	COMMENTS
1	2 * 16	1.5	SATISFACTORY	SATISFACTORY	-
2	2 * 16	1.5	SATISFACTORY	SATISFACTORY	-
3	4 * 25	1.5	SATISFACTORY	SATISFACTORY	-
4	4 * 25	1.5	SATISFACTORY	SATISFACTORY	-

General comments :

На основании чл. 2
от 33ЛД

0824

**СПИСЪК НА ОТДЕЛНИТЕ ИЗПИТВАНИЯ ЗА ОПЪВАТЕЛНА КЛЕМА тип
РС 63 F 27 и РР 63 F 27**

1. № на тест: 0209160 - Тест за якост на кабелните обувки и клемата за засукване;
2. № на тест: 9401200 - Диелектричен и механичен тест.

Съставил:

На основание чл. 2
от ЗЗЛД



Rapport d'essai : Essai de vieillissement climatique après essai de traction mécanique
Test report : *Climatic ageing test after a tensile test*

Rapport d'essai n°	: 11 02 390	Test report n.	: 11 02 390
Constructeur	: SICAME	Product brand	: SICAME
Référence produit	: ES 54-14	Product type	: ES 54 14
Demandeur de l'essai	: SICAME S.A.	Demandeur of the test	: SICAME S.A.
Date d'essai	: Du 08 mars au 23 mai 2011	Date of the test	: March, 8 th to May, 23 rd 2011
Date d'émission du rapport	: 26 mai 2011	Report emission date	: May, 26 th 2011

Essais réalisés suivant : NF EN 50483-3 (07/2009), § 8.2.3.4
Tests carried out in accordance with

Ce rapport comprend : 9 pages
This report contains

Conclusion : Les pinces de suspension BT SICAME de type ES 54-14 soumis à essai satisfont aux exigences du § 8.2.3.4 de la norme NF EN 50483-3 (07/2009).
For declaring the conformity, it has not been explicitly taken into account the uncertainty associated with the result.

Conclusion : The tested SICAME suspension clamps ES 54-14 comply with the requirements clause 8.2.3.4 of NF EN 50483-3 (July 2009) standard.
To give a ruling on the conformity, the uncertainty associated to the result is not implicitly involved.

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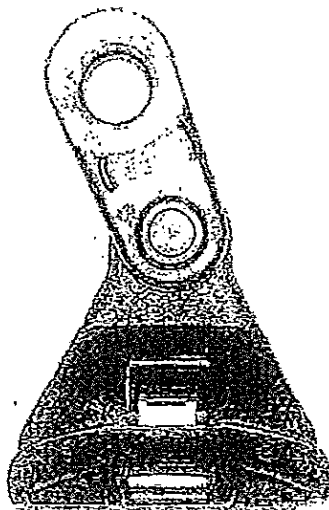
ВЯРНО С ОРИГИНАЛА



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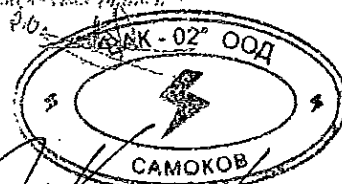
1 Echantillons soumis à essai / Samples under test

Type : Pince de suspension / Suspension clamps
Nombre d'échantillons / Number of samples : 2
Numéro de lot / Batch number : 10M656042
Repérage / Identification : 1, 2
Date de réception au laboratoire : 23 février 2011
Acceptation de l'échantillon : 23 February 2011



ВЯРНО С ОРИГИНАЛА

Visa du responsable de l'essai



2 Caractéristiques du matériel / Equipment used during test

2.1 Appareillage utilisé / Equipment used

N° U.T.	Désignation / Designation	Caractéristiques / Characteristic
99 01 48	Thermomètre indicateur <i>Indicated thermometer</i>	Précision 2°C <i>Accuracy 2°C</i>
91 02 69	Diélectrimètre BOUCHET (10 kV) <i>Dielectrimeter BOUCHET (10 kV)</i>	Précision 0,5mA et 200V <i>Accuracy 0,5mA and 200V</i>
03 02 56	Chronomètre <i>Stop watch</i>	Précision 1 s <i>Accuracy 1s</i>
97 02 02	Réglet étalon <i>Calibrated ruler</i>	Précision 0,5 mm <i>Accuracy 0,5 mm</i>
09 04 54	Wheather-ometer (ATLAS 2)	Conforme à la norme XP C 20-540 <i>Compliant with XP C 20-540 standard</i>
94 03 10	Banc de traction 3 tonnes <i>Traction bench 3 tons</i>	Classe 1 <i>Class 1</i>

2.2 Câbles / Cables

N° Lot / Identification	06054		
Norme / Standard	NF C 33-209		
Provenance / From	France		
Section / Cross section	54,6 mm ²		
Matériau de l'âme / Conductor material	<input type="checkbox"/> Cuivre <i>Copper</i>	<input type="checkbox"/> Aluminium	<input checked="" type="checkbox"/> Alliage d'aluminium <i>Aluminium alloy</i>
Type d'âme / Conductor type	<input type="checkbox"/> Massive <i>Solid</i>	<input checked="" type="checkbox"/> Câblée <i>Stranded</i>	
	<input type="checkbox"/> Rétreinte <i>Compacted</i>	<input checked="" type="checkbox"/> Non rétreinte <i>Non compacted</i>	<input type="checkbox"/> Souple <i>Flexible</i>
Forme d'âme / Conductor shape	<input checked="" type="checkbox"/> Ronde <i>Circular</i>	<input type="checkbox"/> Sectorale <i>Sector-shaped</i>	
Nombre de brins / Number of wires	7		
Ø sur âme / Ø on conductor	9,4 mm		
Matériau de l'isolant Insulation material	XLPE		
Ø sur isolant / Ø on insulation	12,6 mm		
Référence du câble HD626 / HD626 conductor reference	6 E-1		
Charge de rupture minimale (CRM) / Minimum Breaking Load (MBL)	16600 N		
Conditionnement Conditioned on	Le 11 février 2011 (1h00 à 120°C) <i>On February, 11th 2011 (1h00 at 120°C)</i>		

На основание чл. 2
от ЗЗЛД

ВЯРНО С ОПРИГНАЛАТА

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3 Essai / Test procedure

L'essai mécanique est réalisé sur les pinces selon les prescriptions du paragraphe 8.2.2.1 de la norme NF EN 50483-4 (07/2009)

Clamps are tested in accordance with NF EN 50483-4 § 8.2.2.1 (07/2009) standard before the climatic ageing test.

La pince de suspension est montée sur un dispositif similaire à celui utilisé pour son accrochage sur le support. Un effort de traction F_1 est appliqué suivant la direction « R » et progressivement augmenté jusqu'à 60% de la CRM (Charge de Rupture Minimale) du neutre porteur. Cette charge est maintenue pendant 60 s.

The suspension clamp is secured to a device similar to the one used for fixing to a typical support. A tension load F_1 is applied in the direction « R » and gradually increased to 60 % of the MBL (Minimum Breaking Load). This load is maintained for 60 s.

La charge est ensuite augmentée jusqu'à l'effort de traction maximum F_2 défini au Tableau 1.

The load is then increased to the maximum tension load F_2 given in Table 1.

Tableau 1 / Table 1

Angle de déviation <i>Angle of deviation</i>	Effort de traction maximum <i>Maximum tension load</i>
$\alpha \leq 65^\circ$	75% CRM / 75% MBL
$\alpha > 65^\circ$	90% CRM / 90% MBL

Aucune détérioration pouvant nuire au bon fonctionnement de la pince de suspension ne doit se produire.
No damage shall occur which could affect the correct function of the suspension clamp.

Les échantillons sont ensuite soumis à l'essai climatique suivant :

The samples are then submitted to the climatic ageing test following :

Méthodes d'essai selon NF EN 50483-6 (§ 8.5) <i>Test methods in accordance with NF EN 50483-6 (§ 8.5)</i>	
<input checked="" type="checkbox"/> Méthode 1 <i>Method 1</i>	§ 8.5.1
<input type="checkbox"/> Méthode 2 <i>Method 2</i>	§ 8.5.2

Les critères suivants sont utilisés pendant l'essai :

- Le nombre de pince de suspension est de 2
- 6 cycles de 1 semaine sont réalisés
- la température durant les périodes A et C est de 70°C

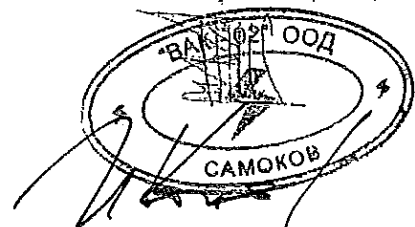
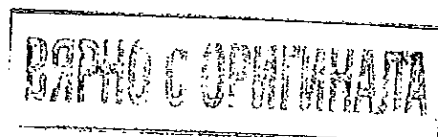
Les échantillons sont installés perpendiculairement au rayonnement de la source lumineuse. L'un est installé de façon à ce que l'ouverture d'introduction du câble soit face à la source lumineuse (échantillon 1) et que l'autre soit installé du côté opposé (échantillon 2).

The following criteria are used during this test :

- Number of suspension samples is 2
- There is 6 cycles of 1 week
- The temperature during periods A and C is 70°C

The samples are installed perpendicular to radiation of the light source. One unit is installed so that the opening for introducing the cable is facing the light source (sample 1) and the other is installed in the opposite direction (sample 2).

Visa du responsable de l'essai
Visa supervisor of the test



4 Exigences / Requirements

Après les cycles de vieillissement climatiques et après une période d'au moins 24h sans dépasser 72 h à l'atmosphère du laboratoire, les échantillons doivent satisfaire aux exigences des essais suivants.

- Le marquage permettant l'identification des échantillons doit être lisible quand il est examiné avec une vue normale ou corrigée, sans grossissement.
- Aucune détérioration pouvant nuire au bon fonctionnement de la pince ne doit se produire.
- Les pinces doivent satisfaire aux exigences de l'essai de tenue diélectrique décrit au 8.2.4.1
- Les 2 échantillons ayant passé l'essai de tenue diélectrique sont soumis à l'essai suivant :
Les pinces doivent satisfaire aux exigences de l'essai mécanique décrit au 8.2.2.1. avec une valeur réduite à 55% de la CRM du neutre porteur car l'essai est répété après l'essai de vieillissement climatique.

Aucune détérioration pouvant nuire au bon fonctionnement des échantillons ne doit se produire.

After the climatic ageing cycles and after a period of at least 24 h but not exceeding 72 h at the laboratory atmosphere, the samples shall meet to the following tests :

- *The sample's identification marking shall be legible when examined with normal or corrected vision, without magnification.*
- *No deterioration of the clamps shall occur which would impair the normal function of the clamp.*
- *The clamps shall meet the requirements of the dielectrical voltage test given in 8.2.4.1.*

*The two samples having passed the dielectrical voltage test are subjected to the following test :
Suspension clamps shall meet the requirements of the mechanical test given in 8.2.2.1. with a reduced value of 55 % of MBL shall be applied as the test is repeated after the climatic test.*

No damage shall occur which could affect the correct function of the samples.

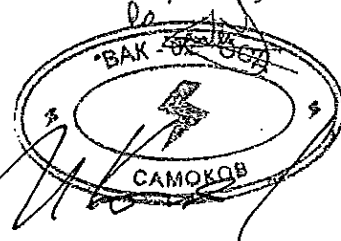
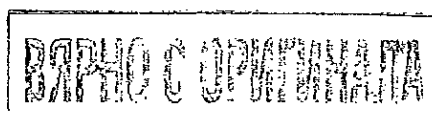
5 Résultats / Results

5.1 Essai mécanique avant le vieillissement climatique / Mechanical test before the ageing climatic

Angle $\alpha = 51,3^\circ$

	Exigences / Requirements	Relevés / Results	
		Echantillon 1 Sample 1	Echantillon 2 Sample 2
Température ambiante et humidité. <i>Ambient temperature and humidity conditions</i>	$15^\circ\text{C} \leq T^\circ \leq 30^\circ\text{C}$ $25\% \leq \text{HR} \leq 75\%$	21 °C 34 % HR	
Effort pendant 1 minute <i>Strength value during 1 minute</i> F ₁ (N)	9960 ± 5%	Min : 9926 Max : 9967	Min : 9935 Max : 9967
Vitesse pour atteindre la valeur F2 <i>Rate for having strength value F2</i>	5000 ≤ ... ≤ 7500 (N/min)	6250	6250
Effort <i>Strength value</i> F ₂ (N)	> 12450	12456	12455

Visa du responsable de l'essai
Visa supervisor of the test



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Après les cycles de vieillissement climatiques et après une période de 68 heures à l'atmosphère du laboratoire, les échantillons sont soumis aux essais suivants :
After the climatic ageing cycles and after a period of 68 hours at the laboratory atmosphere, the samples are submitted to the following tests :

5.2 Essai de tenue diélectrique / Dielectrical voltage test

	Exigences <i>Requirements</i>	Relevés <i>Results</i>
Vitesse de montée en tension <i>Voltage increase rate</i>	≈ 1 kV/s	≈ 1 kV/s

	Exigences / <i>Requirements</i>	Résultats / <i>Results</i>
6 kV pendant 1 minute après essai climatique. <i>6 kV during 1 min after climatic ageing test.</i>	Pas de claquage <i>No breakdown</i>	Echantillon 1 : pas de claquage <i>Sample 1 : No breakdown</i> Echantillon 2 : pas de claquage <i>Sample 2 : No breakdown</i>

5.3 Essai mécanique après le vieillissement climatique / Mechanical test after the ageing climatic

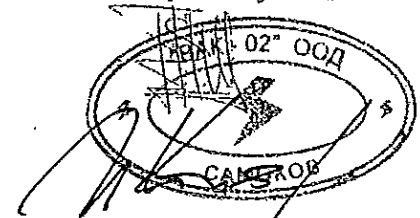
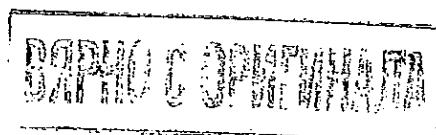
	Exigences / <i>Requirements</i>	Relevés / <i>Results</i>	
		Echantillon 1 <i>Sample 1</i>	Echantillon 2 <i>Sample 2</i>
Vitesse pour atteindre la valeur F <i>Rate for having strength value F</i>	Entre 5000 et 7500 N/min <i>Between 5000 and 7500 N/min</i>	6250	6250
Effort (55% de la CRM) <i>Strength value (55% of MBL) F (N)</i>	9130 ± 5%	Aucune détérioration <i>No damage</i>	Aucune détérioration <i>No damage</i>

6 Conclusion / Conclusion

Le marquage permettant l'identification des échantillons est lisible.
Aucune détérioration pouvant nuire au bon fonctionnement de la pince de suspension ne se produit.

*The sample's identification marking is legible.
After applying strength at value for 1 min, no breakdown of any part of the suspension clamp are observed.*

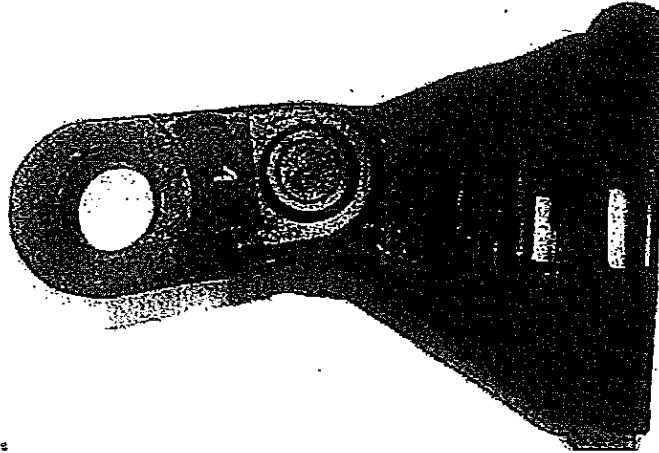
Visa du responsable de l'essai
Visa supervisor of the test



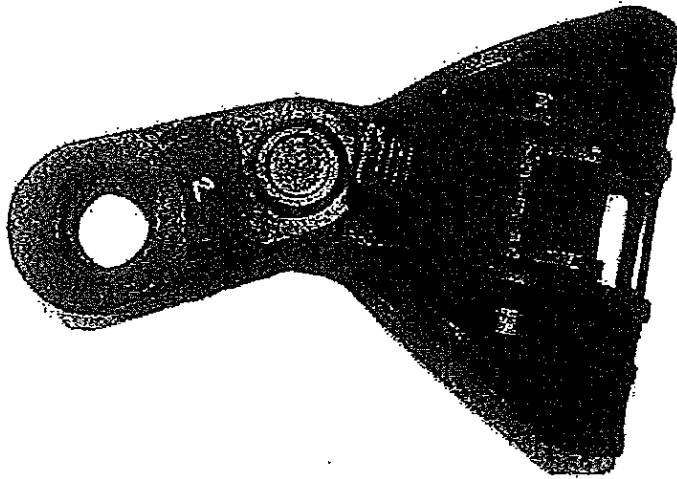
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7 Photographies / Pictures

Echantillon 1 après le vieillissement climatique / *Sample 1 after the climatic ageing test*



Echantillon 2 après le vieillissement climatique / *Sample 2 after the climatic ageing test*



Visa du responsable de l'essai
Visa supervisor of the test

ВАРНО С ОБЩИНАТА

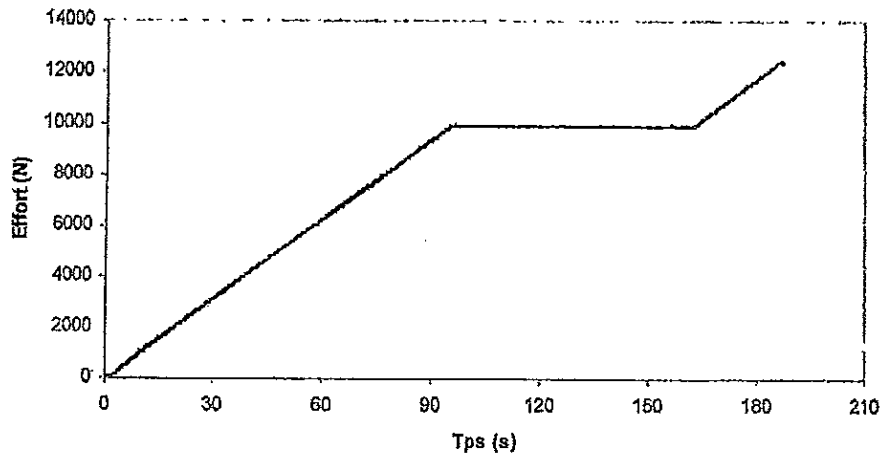
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ИЗВАН - 02" ООД
С. САНДЖОВ

892

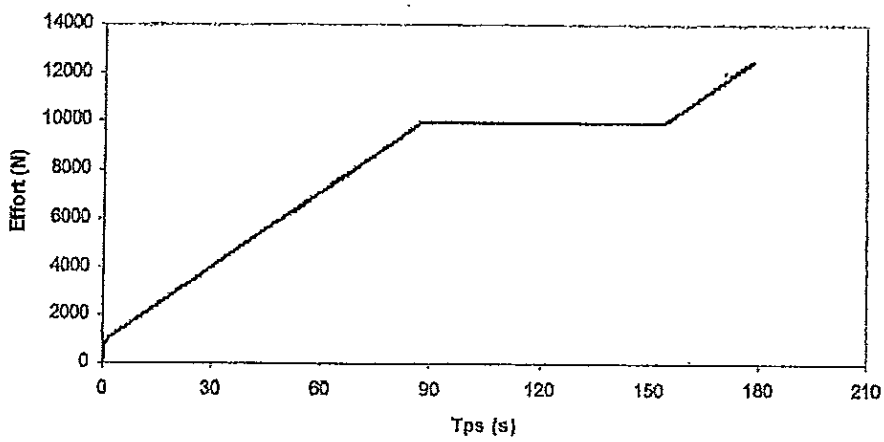
8 Courbes / Curves

Essai mécanique avant le vieillissement climatique / Mechanical test before the ageing climatic

Echantillon 1 / Sample 1



Echantillon 2 / Sample 2



Visa du responsable de l'essai



ВЪРНО С ОПРИЛНАТА

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