

INSPECTION REPORT

APPROVED

B9014920

Client ELCON MEGARAD S.p.A.
Via Nazionale, 110 – Arcella (Avellino) – Italy

Subject Inspection to tests on heat shrinkable outdoor terminations for single core plastic or rubber insulated cables with wire screen, types:
1- ELCOTERM TES – 2484X/W-3X1—NL02
2- ELCOTERM TES – 2484X/W-3X1—NL03
3- ELCOTERM TES – 2484X/W-3X1—NL05
manufactured by ELCON MEGARAD S.p.A., Via Nazionale, 110 - Arcella (Avellino) – Italy

Place and date of inspection ELCON MEGARAD S.p.A.
Via Nazionale, 110 – Arcella (Avellino) – Italy
May 10th to 22nd, 2019

Notes -

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N. of pages 7 **N. of pages annexed** -

Issue date September 9th, 2019

Prepared TCE/CER/PRO – Antonio VELE

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Approved TCE/CER – Roberto PICCIN



ISP N° 024E

Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
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Testing & Certification Division
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Il Responsabile
(Roberto Piccin)

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1 GENERAL

This report concerns the inspection activity requested by ELCON MEGARAD S.p.A. to tests on heat shrinkable outdoor terminations for single core plastic or rubber insulated cables with wire screen, types:

- ELCOTERM TES – 2484X/W-3X1—NL02
- ELCOTERM TES – 2484X/W-3X1—NL03
- ELCOTERM TES – 2484X/W-3X1—NL05

manufactured by ELCON MEGARAD S.p.A., Via Nazionale, 110 - Arcella (Avellino) – Italy.

During the inspection were present:

- ELCON MEGARAD S.p.A.: Mr. Generoso De Simone
Mr. Ciro Del Vecchio
Mr. Franco Lombardo
- CESI: Mr. Antonio Vele

This activity was carried out by CESI as Type A Inspection Body, in the field of ACCREDIA accreditation No.024E of conformity with the Standard EN ISO/IEC 17020 and the application guidelines of the Standard itself ILAC-P15.

2 RATINGS

All the following data were found in the documents supplied by ELCON MEGARAD S.p.A.

| | |
|---|------------------------------------|
| ELCOTERM TES – 2484X/W-3X1-NL02 | |
| Manufacturer: ELCON MEGARAD S.p.A. | |
| Factory: Via Nazionale, 110 – Arcella (Avellino) – Italy | |
| Heat shrinkable outdoor termination for single core plastic or rubber insulated cables with wire screen | |
| ELCON MEGARAD CODE | FN20036 |
| LOT NUMBER | A1217U SERIAL 0001 |
| VOLTAGES | Uo/U=12,7/22kV Um=24kV |
| CABLES RANGE | 1x25mm ² Cu |
| CABLE MARKING | HXCMK 1x25rs + as25 12/20kV - XLPE |
| DRAWING | 862X/NL02 |

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| | |
|---|---|
| ELCOTERM TES – 2484X/W-3X1-NL03 | |
| Manufacturer: ELCON MEGARAD S.p.A. | |
| Factory: Via Nazionale, 110 – Arcella (Avellino) – Italy | |
| Heat shrinkable outdoor termination for single core plastic or rubber insulated cable with wire screen | |
| ELCON MEGARAD CODE | FN20034 |
| LOT NUMBER | A1218U – A1221 SERIAL 0001 |
| VOLTAGES | Uo/U=12,7/22kV Um=24kV |
| CABLES RANGE | 1x95 - 240mm ² Cu/Al |
| CABLE MARKING | YMeKrvaslqwd Fca 1x95rs + as25 12/20kV – XLPE YMeKrvaslqwd Fca 1x240Alrm + as35 12/20kV - XLPE |
| DRAWING | 862X/NL03 |

| | |
|---|--|
| ELCOTERM TES – 2484X/W-3X1-NL05 | |
| Manufacturer: ELCON MEGARAD S.p.A. | |
| Factory: Via Nazionale, 110 – Arcella (Avellino) – Italy | |
| Heat shrinkable outdoor termination for single core plastic or rubber insulated cable with wire screen | |
| ELCON MEGARAD CODE | FN19364 |
| LOT NUMBER | A1222 SERIAL 0001 |
| VOLTAGES | Uo/U=12,7/22kV Um=24kV |
| CABLES RANGE | 1x800mm ² Al |
| CABLE MARKING | YMeKrvaslqwd Fca 1x800Alrm + as50 12/20kV - XLPE |
| DRAWING | 862X/NL05 |

3 IDENTIFICATION OF THE TESTED SAMPLES

The dimensions of the tested Heat-shrinkable outdoor terminations, indicated above, were found in compliance with the relevant Installation Instructions supplied by the Manufacturer (reference document 4.2[1]).

4 REFERENCE DOCUMENTS

4.1 Normative documents

- [1] CENELEC HD 629.1 53:2019: "Test requirements on accessories for use on power cables of rated voltage from 3,6/6(7,2) kV up to 20,8/36(42) kV. Part 1: cables with extruded insulation".
- [2] CEI EN 61442 Ed. 2 (2006): "Test methods for accessories for power cables with rated voltages from 6 kV (Um = 7,2 kV) up to 30 kV (Um = 36 kV)".

4.2 Documents used for the identification of the tested sample

- [1] ELCON MEGARAD S.p.A. Installation Instructions ECOTERM TES – 2484X/W-3X1 (CESI registration number B9014925).

4.3 Manufacturer's Test Reports

- [1] ELCON MEGARAD S.p.A. Test Report No. 119_19 dated 2019/07/22 (CESI registration number B9014924).

4.4 Other documents

- [1] Laboratory check-list (CESI registration number B7007676).

5 ASSESSMENT OF LABORATORY ADEQUACY

The adequacy of the laboratory for the performance of the required tests was assessed. The details of the checks performed by CESI Inspector Mr. Antonio Vele during a recent inspection to the same laboratory can be considered still valid and are reported in the laboratory check-list (reference document 4.4[1]).

On the basis of the modalities of performing and managing the tests, the competence of the laboratory staff charged with the performance of the tests themselves was ascertained.

The measuring instruments used are indicated in ELCON MEGARD Test Report (reference document 4.3[1]). For each instrument, the following data have been reported: description, manufacturer, type, serial number or internal code, the expiry date of calibration, precision.

The adequacy and calibration state of the measuring instruments used were verified, checking the calibration dates indicated on the labels of the instruments and the relevant certificates.

6 TESTS PERFORMED

Before the tests on heat shrinkable outdoor terminations, the following activities were carried out.

1. Quality and quantity check of the components mentioned in the bill of materials:
The components were found new and in good state
2. Witnessing of the test loop assembling:
The assembling of the heat shrinkable outdoor terminations was done according to the Installation Instructions

For the tests, the following compositions of the cable lines were installed:

| COMPOSITION LINE | | | |
|------------------|---|-------------------------|--|
| LINE | TERMINATION 1 | CABLE | TERMINATION 2 |
| AT045-19 | ELCOTERM TES- 2484X/W-3X1-NL02 Cables Lug NEXANS 16-95 mm ² | 1x25 mm ² Cu | ELCOTERM TES- 2484X/W-3X1-NL02 Cables Lug NILED 25-95 mm ² |

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| | | | |
|----------------------|--|--------------------------|---|
| AT046-19 | ELCOTERM TES- 2484X/W-3X1-NL03 Cables Lug TE 50-240 mm ² | 1x95 mm ² Cu | ELCOTERM T ES- 2484X/W-3X1-NL03 Cable Lug PFISTERER 50-240 mm ² |
| AT047-19 AT053-19 | ELCOTERM TES- 2484X/W-3X1-NL03 Cables Lug TE 50-240 mm ² Cable Lug PFISTERER 50-240 mm ² | 1x240 mm ² Al | ELCOTERM TES- 2484X/W-3X1-NL03 Cables Lug NILED 16-95 mm ² Cable Lug NEXANS 70-240 mm ² |
| AT054-19 | ELCOTERM TES- 2484X/W-3X1-NL05 Cables Lug TE 630-800 mm ² | 1x800 mm ² Al | ELCOTERM T ES- 2484X/W-3X1-NL03 Cable Lug PFISTERER 300/630-800 mm ² |

In presence of CESI Inspector, the following tests were performed:

| Normative document | Clause | Sequence | Test | Test Report | Test results |
|--------------------|--------------------|----------|--|-------------|--------------|
| HD 629.1 S3 | Table 11 - Item 1 | A1 | AC voltage withstand dry test (4,5 U _o) | 4.3[1] | Passed |
| HD 629.1 S3 | Table 11 - Item 2 | A1 | AC voltage withstand wet test (4 U _o) | 4.3[1] | Passed |
| HD 629.1 S3 | Table 11 - Item 3 | A1 | Partial discharge at ambient temperature (2U _o) | 4.3[1] | Passed |
| HD 629.1 S3 | Table 11 - Item 4 | A1 | Impulse voltage at elevated temperature | 4.3[1] | Passed |
| HD 629.1 S3 | Table 11 - Item 5 | A1 | Heating cycle voltage in air (2,5U _o) | 4.3[1] | Passed |
| HD 629.1 S3 | Table 11 - Item 6 | A1 | Immersion | 4.3[1] | Passed |
| HD 629.1 S3 | Table 11 - Item 7 | A1 | Partial discharge at elevated and ambient temperature (2U _o) | 4.3[1] | Passed |
| HD 629.1 S3 | Table 11 - Item 11 | A1 | Impulse voltage at ambient temperature | 4.3[1] | Passed |
| HD 629.1 S3 | Table 11 - Item 12 | A1 | AC voltage withstand dry test (4,5U _o) | 4.3[1] | Passed |
| HD 629.1 S3 | Table 11 - Item 13 | A1 | Partial discharge at ambient temperature (2U _o) | 4.3[1] | Passed |
| HD 629.1 S3 | Table 11 - Item 15 | A1 | Visual examination according to annex C | 4.3[1] | Passed |
| HD 629.1 S3 | Table 11 - Item 1 | A2 | AC voltage withstand dry test (4,5 U _o) | 4.3[1] | Passed |
| HD 629.1 S3 | Table 11 - Item 13 | A2 | Impulse voltage at ambient temperature | 4.3[1] | Passed |
| HD 629.1 S3 | Table 11 - Item 1 | A2 | AC voltage withstand dry test (4,5 U _o) | 4.3[1] | Passed |
| HD 629.1 S3 | Table 11 - Item 15 | A2 | Visual examination according to annex C | 4.3[1] | Passed |
| HD 629.1 S3 | Table 11 - Item 14 | A3 | Salt fog (1,25U _o) | 4.3[1] | Passed |
| HD 629.1 S3 | Table 11 - Item 15 | A3 | Visual examination according to annex C | 4.3[1] | Passed |
| HD 629.1 S3 | Table 17 - Item 1 | - | AC voltage dry withstand test (4,5 U _o) | 4.3[1] | Passed |

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| Normative document | Clause | Sequence | Test | Test Report | Test results |
|--------------------|-------------------|----------|--|-------------|--------------|
| HD 629.1 S3 | Table 17 - Item 2 | - | Partial discharge at ambient temperature (2Uo) | 4.3[1] | Passed |
| HD 629.1 S3 | Table 17 - Item 3 | - | Impulse voltage at ambient temperature | 4.3[1] | Passed |
| HD 629.1 S3 | Table 17 - Item 4 | - | Heating cycle voltage in air (2,5Uo) | 4.3[1] | Passed |
| HD 629.1 S3 | Table 17 - Item 5 | - | AC voltage dry withstand test (4,5 Uo) | 4.3[1] | Passed |
| HD 629.1 S3 | Table 17 - Item 6 | - | Partial discharge at elevated and ambient temperature(2Uo) | 4.3[1] | Passed |
| HD 629.1 S3 | Table 17 - Item 7 | - | Visual examination according to annex C | 4.3[1] | Passed |

7 NON CONFORMITIES

During the inspection no non conformities were found.

8 CONCLUSIONS

On the basis of the results obtained it is possible to conclude that the Heat-shrinkable outdoor terminations for single-core plastic or rubber insulated cables with wire screen types:

- ELCOTERM TES – 2484X/W-3X1—NL02 code FN20036
- ELCOTERM TES – 2484X/W-3X1—NL03 code FN20034
- ELCOTERM TES – 2484X/W-3X1—NL05 code FN19364

manufactured by ELCON MEGARAD S.p.A., Via Nazionale, 110 - Arcella (Avellino) – Italy, passed the tests listed in item 6.

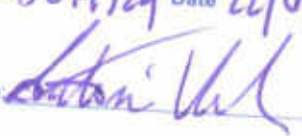
TEST REPORT

N° 119_19



ELCOTERM TES-2484X/W-3X1-NL02
ELCOTERM TES-2484X/W-3X1-NL03
ELCOTERM TES-2484X/W-3X1-NL05

CESI

Reg. No. B904924 Date 22/07/2019
Signature: 



Prepared by: Francesco Lombardo

Approved by: Generoso De Simone

CLIENT: ENEXIS**TEST LABORATORY:** ELCON MEGARAD S.p.A.
Arcella – Avellino – ITALY**TEST OBJECT:**

Heat shrinkable outdoor termination for single core plastic or rubber insulated cable with wire screen.

TYPE:**ELCOTERM TES – 2484X/W-3X1-NL02****ELCOTERM TES – 2484X/W-3X1-NL03****ELCOTERM TES – 2484X/W-3X1-NL05****VOLTAGE:** $U_0 / U = 12,7/22 \text{ kV} (U_m 24 \text{ kV})$ **SECTIONS:** $1 \times 25 \text{ mm}^2 \text{ Cu} / 1 \times 95 \text{ mm}^2 \text{ Cu} / 1 \times 240 \text{ mm}^2 \text{ Al} / 1 \times 800 \text{ mm}^2 \text{ Al}$

HXCMK 1x25rs + as25 12/20kV - XLPE

YMeKvaslqwd Fca 1x95rs + as25 12/20kV - XLPE

YMeKvaslqwd Fca 1x240Alrm + as35 12/20kV - XLPE

YMeKvaslqwd Fca 1x800Alrm + as50 12/20kV - XLPE

NORMATIVE:

CENELEC HD 629.1 S3:2019

TEST METHODS:

CEI EN 61442:2006

CONTROL:

The components mentioned in the bill of materials of the drawing
862X/NL02 + 862X/NL03 + 862X/NL05 have been identified and found in good state.
Assembled by ELCON MEGARAD operator, according to the installation instruction.

DATE OF TEST:

10 MAY to 22 JULY 2019

TEST RESULT:

The test results comply with the requirements of the reference normative document.

See page 3+4



ELCON MEGARAD
Operator
Francesco Lombardo



ELCON MEGARAD
H.V. Lab. Responsible
Generoso De Simone

CESIInspector
verified by

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Inspector
Antonio Vele

TEST SEQUENCE

CENELEC HD 629.1 S3:2019 - Table 11

Sequence A1

| N° | Test | Requirements | Parameters | Result |
|----|--|----------------------------|-------------------------------|--------|
| 01 | A.C. voltage withstand dry (4,5U ₀) | No breakdown nor flashover | 57 kV / 5 min. | Passed |
| 02 | A.C. voltage withstand wet (4 U ₀) | No breakdown nor flashover | 51 kV / 1 min. | Passed |
| 03 | Partial discharge at ambient temperature (2U ₀) | max. 10 pC | 25 kV | Passed |
| 04 | Impulse voltage at elevated temperature | No breakdown nor flashover | 125 kV 10 of each polarity | Passed |
| 05 | Heating cycle voltage in air (2,5U ₀) | No breakdown nor flashover | 32 kV / 126 cycles | Passed |
| 06 | Immersion | - | 10 cycles | Passed |
| 07 | Partial discharge at elevated temperature (2U ₀) | max. 10 pC | 25 kV | Passed |
| 08 | Partial discharge at ambient temperature (2U ₀) | max. 10 pC | 25 kV | Passed |
| 09 | Impulse voltage at ambient temperature | No breakdown nor flashover | 125 kV 10 of each polarity | Passed |
| 10 | A.C. voltage withstand dry (4,5U ₀) | No breakdown nor flashover | 57 kV / 5 min. | Passed |
| 11 | Partial discharge at ambient temperature (2U ₀) | max. 10 pC | 25 kV | Passed |
| 12 | Visual examination | According to Annex C | - | Passed |

Sequence A2

| | | | | |
|----|---|----------------------------|-------------------------------|--------|
| 13 | A.C. voltage withstand dry (4,5U ₀) | No breakdown nor flashover | 57 kV / 5 min. | Passed |
| 14 | Thermal short circuit screen | No breakdown | N° 2 to 5 kA / 1 s | Passed |
| 15 | Thermal short circuit conductor | No breakdown | N° 2 to 27,8 kA / 1 s | Passed |
| 16 | Impulse voltage at ambient temperature | No breakdown nor flashover | 125 kV 10 of each polarity | Passed |
| 17 | A.C. voltage withstand dry (4,5U ₀) | No breakdown nor flashover | 57 kV / 5 min. | Passed |
| 18 | Visual examination | According to Annex C | - | Passed |

Sequence A3

| | | | | |
|----|---------------------------------|-----------------------------------|----------------|--------|
| 19 | Salt fog (1,25 U ₀) | No breakdown no more than 3 trips | 16 kV / 1000 h | Passed |
| 20 | Visual examination | According to Annex C | - | Passed |

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Francesco Lombardo
ELCON MEGARAD
Operator
Francesco Lombardo

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ELCON MEGARAD
H.V. Lab. Responsible
Generoso De Simone

CESI
Inspector
Antonio Vele

TEST SEQUENCE

CENELEC HD 629.1 S3:2019 - Table 17

Sequence

| N° | Test | Requirements | Parameters | Result |
|----|--|----------------------------|-------------------------------|--------|
| 21 | A.C. voltage withstand dry (4,5U _o) | No breakdown nor flashover | 57 kV / 5 min. | Passed |
| 22 | Partial discharge at ambient temperature (2U _o) | max. 10 pC | 25 kV | Passed |
| 23 | Impulse voltage at ambient temperature | No breakdown nor flashover | 125 kV 10 of each polarity | Passed |
| 24 | Heating cycle voltage in air (2,5U _o) | No breakdown nor flashover | 32 kV / 12 cycles | Passed |
| 25 | A.C. voltage withstand dry (4,5U _o) | No breakdown nor flashover | 57 kV / 5 min. | Passed |
| 26 | Partial discharge at elevated temperature (2U _o) | max. 10 pC | 25 kV | Passed |
| 27 | Partial discharge at ambient temperature (2U _o) | max. 10 pC | 25 kV | Passed |
| 28 | Visual examination | According to Annex C | - | Passed |

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Operator
Francesco Lombardo

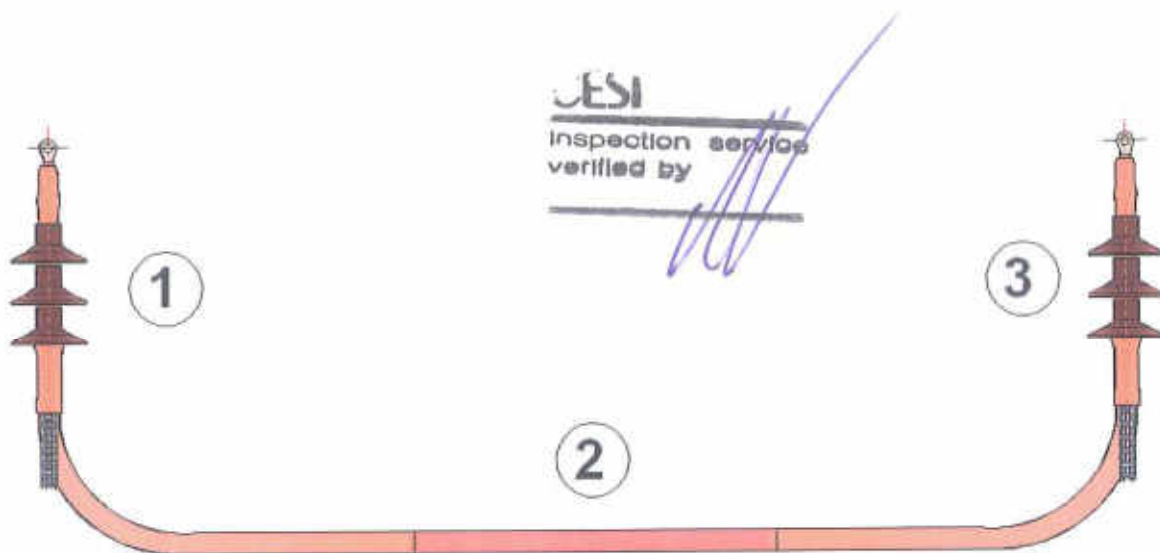



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COMPOSITION OF THE CABLE LINE

| Line | Termination 1 | Cable 2 | Termination 3 |
|---------------------------|--|-------------------------|--|
| AT045-19 | ELCOTERM TES – 2484X/W-3X1-NL02 Cable Lug NEXANS 16-95mm ² | 1x25mm ² Cu | ELCOTERM TES – 2484X/W-3X1-NL02 Cable Lug NILED 25-95mm ² |
| AT046-19 | ELCOTERM TES – 2484X/W-3X1-NL03 Cable Lug TE 50-240mm ² | 1x95mm ² Cu | ELCOTERM TES – 2484X/W-3X1-NL03 Cable Lug PFISTERER 50-240mm ² |
| AT047-19 ÷ AT053-19 | ELCOTERM TES – 2484X/W-3X1-NL03 Cable Lug TE 50-240mm ² Cable Lug PFISTERER 50-240mm ² | 1x240mm ² Al | ELCOTERM TES – 2484X/W-3X1-NL03 Cable Lug NILED 50-240mm ² Cable Lug NEXANS 70-240mm ² |
| AT054-19 | ELCOTERM TES – 2484X/W-3X1-NL05 Cable Lug TE 630-800mm ² | 1x800mm ² Al | ELCOTERM TES – 2484X/W-3X1-NL05 Cable Lug PFISTERER 300/630-800mm ² |



Indicative scheme of cable line


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| TEST 01 | A.C. voltage withstand dry | | |
|----------------------------------|--------------------------------|--|--|
| Line: | AT046-19 + AT047-19 + AT054-19 | | |
| Date: | 10/05/2019 | | |
| Applied Voltage: | 57 kV | | |
| Testing time: | 5 min. | | |
| Result: | No breakdown nor flashover | | |
| Measuring Test Equipment: AT 213 | | | |

| TEST 02 | A.C. voltage withstand wet | | |
|----------------------------------|--------------------------------|--|--|
| Line: | AT046-19 + AT047-19 + AT054-19 | | |
| Date: | 10/05/2019 | | |
| Applied Voltage: | 51 kV | | |
| Testing time: | 1 min. | | |
| Result: | No breakdown nor flashover | | |
| Measuring Test Equipment: AT 213 | | | |

| TEST 03 | Partial discharge at ambient temperature | | |
|--|--|----------|----------|
| Line: | AT046-19 | AT047-19 | AT054-19 |
| Date: | 10/05/2019 | | |
| Applied Voltage: | 25 kV | | |
| Partial discharge level: | 1,2 pC | 1 pC | 1 pC |
| Result: | These values are lower than maximum permissible value 10 pC. | | |
| Note: Calibrated before the test. | | | |
| Measuring Test Equipment: AT 213, AT 219 | | | |

| TEST 04 | Impulse voltage at elevated temperature | |
|--|---|------------|
| Line: | AT046-19 + AT047-19 + AT054-19 | |
| Date: | 16/05/2019 | |
| Polarity: | + Positive | - Negative |
| Applied Voltage: | 125 kV | |
| Testing: | N° 10 | |
| Result: | No breakdown nor flashover | |
| Measuring Test Equipment : AT 169 , AT 226 | | |


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| TEST 05 | Heating Cycles voltage in air |
|---|--------------------------------|
| Line: | AT046-19 + AT047-19 + AT054-19 |
| Date: | 17/05/2019 – 01/07/2019 |
| Test Voltage: | 32 kV |
| Number of cycles: | N° 126 |
| Result: | No breakdown nor flashover |
| Note: Each heating cycle is completed in 8h and it is carried out in 5h of heating ON with injection of the loading current and 3h heating OFF, with natural cooling of the cable until ambient temperature. During the heating time, the cable conductor keeps a value of temperature 5-10K above the maximum cable conductor (90°C) temperature for at least 2 hours. | |
| Measuring Test Equipment : AT 228 / AT 229 / AT 181 - AT 183 / AT 280 - AT 289 | |

| TEST 06 | Immersion |
|---|--------------------------------|
| Line: | AT046-19 + AT047-19 + AT054-19 |
| Date: | 02/07/2019 – 05/07/2019 |
| Number of cycles: | N° 10 |
| Result: | No breakdown nor flashover |
| Note: Each heating cycle is completed in 8h and it is carried out in 5h of heating ON with injection of the loading current and 3h heating OFF, with natural cooling of the cable until ambient temperature. During the heating time, the cable conductor keeps a value of temperature 5-10K above the maximum cable conductor (90°C) temperature for at least 2 hours. | |
| Measuring Test Equipment : AT 228 / AT 229 / AT 181 - AT 183 / AT 280 - AT 289 | |

| TEST 07 | Partial discharge at elevated temperature | | |
|--|--|----------|----------|
| Line: | AT046-19 | AT047-19 | AT054-19 |
| Date: | 11/07/2019 | | |
| Applied Voltage: | 25 kV | | |
| Partial discharge level: | 1 pC | 1 pC | 2 pC |
| Result: | These values are lower than maximum permissible value 10 pC. | | |
| Note: Calibrated before the test. | | | |
| Measuring Test Equipment: AT 213, AT 219 | | | |


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| TEST 08 | Partial discharge at ambient temperature | | |
|--|--|----------|----------|
| Line: | AT046-19 | AT047-19 | AT054-19 |
| Date: | 11/07/2019 | | |
| Applied Voltage: | 25 kV | | |
| Partial discharge level: | 1 pC | 2 pC | 2 pC |
| Result: | These values are lower than maximum permissible value 10 pC. | | |
| Note: Calibrated before the test. | | | |
| Measuring Test Equipment: AT 213, AT 219 | | | |

| TEST 09 | Impulse voltage at ambient temperature | |
|--|--|------------|
| Line: | AT046-19 + AT047-19 + AT054-19 | |
| Date: | 11/07/2019 | |
| Polarity: | + Positive | - Negative |
| Applied Voltage: | 125 kV | |
| Testing: | N° 10 | |
| Result: | No breakdown nor flashover | |
| Measuring Test Equipment : AT 169 , AT 226 | | |

| | | | |
|----------------------------------|--------------------------------|--|--|
| TEST 10 | A.C. voltage withstand dry | | |
| Line: | AT046-19 + AT047-19 + AT054-19 | | |
| Date: | 11/07/2019 | | |
| Applied Voltage: | 57 kV | | |
| Testing time : | 5 min. | | |
| Result: | No breakdown nor flashover | | |
| Measuring Test Equipment: AT 213 | | | |

| TEST 11 | Partial discharge at ambient temperature | | |
|--|--|----------|----------|
| Line: | AT046-19 | AT047-19 | AT054-19 |
| Date: | 11/07/2019 | | |
| Applied Voltage: | 25 kV | | |
| Partial discharge level: | 1 pC | 1 pC | 1,5 pC |
| Result: | These values are lower than maximum permissible value 10 pC. | | |
| Note: Calibrated before the test. | | | |
| Measuring Test Equipment: AT 213, AT 219 | | | |


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| TEST 12 | Visual examination |
|--|--------------------------------|
| Line: | AT046-19 + AT047-19 + AT054-19 |
| Date : | 12/07/2019 |
| Note: According to Annex C : <ul style="list-style-type: none"> No presence of water or moisture beyond the sealing barriers. No presence of corrosion on any metallic parts. No electrical degradation in primary insulation. No mechanical degradation. No thermal degradation. No leakage of insulating material. No obvious shrinkage of cable components. | |

| TEST 13 | A.C. voltage withstand dry |
|----------------------------------|--------------------------------|
| Line: | AT051-19 + AT052-19 + AT053-19 |
| Date: | 16/05/2019 |
| Applied Voltage: | 57 kV |
| Testing time : | 5 min. |
| Result: | No breakdown nor flashover |
| Measuring Test Equipment: AT 213 | |

| TEST 14 | Thermal short circuit screen |
|---|--------------------------------|
| Line: | AT051-19 + AT052-19 + AT053-19 |
| Number: | N° 2 |
| Applied current: | 5 kA |
| Testing time: | 1 s |
| Result: | No breakdown |
| Note: Earth lug at break and at crimping. | |
| Measuring Test: SVEPPI – SIEMENS see Test Report N° RP LS 19/164A | |

| TEST 15 | Thermal short circuit conductor |
|---|---------------------------------|
| Line: | AT051-19 + AT052-19 + AT053-19 |
| Number: | N° 2 |
| Applied current: | 27,8 kA |
| Testing time: | 1 s |
| Result: | No breakdown |
| Measuring Test: SVEPPI - SIEMENS see Test Report N° RP LS 19/164A | |



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| TEST 16 | Impulse voltage at ambient temperature | |
|--|--|------------|
| Line: | AT051-19 + AT052-19 + AT053-19 | |
| Date: | 12/07/2019 | |
| Polarity: | + Positive | - Negative |
| Applied Voltage: | 125 kV | |
| Testing: | N° 10 | |
| Result: | No breakdown nor flashover | |
| Measuring Test Equipment : AT 169 , AT 226 | | |

| TEST 17 | A.C. voltage withstand dry | |
|----------------------------------|--------------------------------|--|
| Line: | AT051-19 + AT052-19 + AT053-19 | |
| Date: | 12/07/2019 | |
| Applied Voltage: | 57 kV | |
| Testing time : | 5 min. | |
| Result: | No breakdown nor flashover | |
| Measuring Test Equipment: AT 213 | | |

| TEST 18 | Visual examination | |
|--|--------------------------------|--|
| Line: | AT051-19 + AT052-19 + AT053-19 | |
| Date : | 12/07/2019 | |
| Note: According to Annex C : <ul style="list-style-type: none">• No presence of water or moisture beyond the sealing barriers.• No presence of corrosion on any metallic parts.• No electrical degradation in primary insulation.• No mechanical degradation.• No thermal degradation.• No leakage of insulating material.• No obvious shrinkage of cable components. | | |

| TEST 19 | Salt fog | |
|--|--------------------------------|--|
| Line: | AT048-19 + AT049-19 + AT050-19 | |
| Date: | 30/05/2019 – 11/07/2019 | |
| Test Voltage: | 16 kV | |
| Duration: | 1000 h | |
| Result: | No failure | |
| Note: | | |
| Water conductivity : 1600±200 mS/m. | | |
| Measuring Test Equipment : AT 301 / AT 162 | | |




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| TEST 20 | Visual examination |
|--|--------------------------------|
| Line: | AT048-19 + AT049-19 + AT050-19 |
| Date : | 12/07/2019 |
| Note: According to Annex C : <ul style="list-style-type: none"> No presence of water or moisture beyond the sealing barriers. No presence of corrosion on any metallic parts. No electrical degradation in primary insulation. No mechanical degradation. No thermal degradation. No leakage of insulating material. No obvious shrinkage of cable components. | |

| TEST 21 | A.C. voltage withstand dry |
|----------------------------------|----------------------------|
| Line: | AT045-19 |
| Date: | 10/05/2019 |
| Applied Voltage: | 57 kV |
| Testing time: | 5 min. |
| Result: | No breakdown nor flashover |
| Measuring Test Equipment: AT 213 | |

| TEST 22 | Partial discharge at ambient temperature |
|--|--|
| Line: | AT045-19 |
| Date: | 10/05/2019 |
| Applied Voltage: | 25 kV |
| Partial discharge level: | 5 pC |
| Result: | These values are lower than maximum permissible value 10 pC. |
| Note: Calibrated before the test. | |
| Measuring Test Equipment: AT 213, AT 219 | |

| TEST 23 | Impulse voltage at ambient temperature |
|--|--|
| Line: | AT045-19 |
| Date: | 16/05/2019 |
| Polarity: | + Positive - Negative |
| Applied Voltage: | 125 kV |
| Testing: | N° 10 |
| Result: | No breakdown nor flashover |
| Measuring Test Equipment : AT 169 , AT 226 | |


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| TEST 24 | Heating Cycles voltage in air |
|---|-------------------------------|
| Line: | AT045-19 |
| Date: | 17/05/2019 – 21/05/2019 |
| Test Voltage: | 32 kV |
| Number of cycles: | N° 12 |
| Result: | No breakdown nor flashover |
| Note: Each heating cycle is completed in 8h and it is carried out in 5h of heating ON with injection of the loading current and 3h heating OFF, with natural cooling of the cable until ambient temperature. During the heating time, the cable conductor keeps a value of temperature 5-10K above the maximum cable conductor (90°C) temperature for at least 2 hours. | |
| Measuring Test Equipment : AT 228 / AT 229 / AT 181 - AT 183 / AT 280 - AT 289 | |

| TEST 25 | A.C. voltage withstand dry |
|----------------------------------|----------------------------|
| Line: | AT045-19 |
| Date: | 30/05/2019 |
| Applied Voltage: | 57 kV |
| Testing time : | 5 min. |
| Result: | No breakdown nor flashover |
| Measuring Test Equipment: AT 213 | |

| TEST 26 | Partial discharge at elevated temperature |
|--|--|
| Line: | AT045-19 |
| Date: | 30/05/2019 |
| Applied Voltage: | 25 kV |
| Partial discharge level: | 4,5 pC |
| Result: | These values are lower than maximum permissible value 10 pC. |
| Note: Calibrated before the test. | |
| Measuring Test Equipment: AT 213, AT 219 | |

| TEST 27 | Partial discharge at ambient temperature |
|--|--|
| Line: | AT045-19 |
| Date: | 30/05/2019 |
| Applied Voltage: | 25 kV |
| Partial discharge level: | 4,5 pC |
| Result: | These values are lower than maximum permissible value 10 pC. |
| Note: Calibrated before the test. | |
| Measuring Test Equipment: AT 213, AT 219 | |


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| TEST 28 | Visual examination |
|--|--------------------|
| Line: | AT045-19 |
| Date : | 30/05/2019 |
| Note: According to Annex C : <ul style="list-style-type: none"> No presence of water or moisture beyond the sealing barriers. No presence of corrosion on any metallic parts. No electrical degradation in primary insulation. No mechanical degradation. No thermal degradation. No leakage of insulating material. No obvious shrinkage of cable components. | |

MEASURING INSTRUMENTS

| Description | Manufacturer | Supplier's code | Next calibration | Elcon ID | Accuracy |
|---|------------------|-----------------------|------------------|----------|----------|
| Power supply area No. 2 for dielectric test | AME | Reg. No. 2334 | 18/04/2020 | AT 228 | 3% |
| Power supply area No. 3 for dielectric test | AME | Reg. No. 2333 | 13/04/2022 | AT 213 | 3% |
| PD calibrator unit CAL542 | OMICRON | Reg. No. HH462D | 14/03/2022 | AT 219 | 1% |
| Impulse voltage Measuring system | DR. STRAUSS | Reg. No. TR-AS 100-12 | 06/04/2022 | AT 226 | 3% |
| Ohmic capacitive divider | HAEFELY | Reg. No. 99100314.1 | 06/04/2022 | AT 169 | 3% |
| Thermocouple type "T" | ITALCOPPIE | Not applicable | 07/11/2019 | AT 181 | 2% |
| Thermocouple type "T" | ITALCOPPIE | Not applicable | 07/11/2019 | AT 182 | 2% |
| Thermocouple type "T" | ITALCOPPIE | Not applicable | 07/11/2019 | AT 183 | 2% |
| Thermocouple type "T" | ITALCOPPIE | Not applicable | 10/04/2020 | AT 280 | 2% |
| Thermocouple type "T" | ITALCOPPIE | Not applicable | 10/04/2020 | AT 281 | 2% |
| Thermocouple type "T" | ITALCOPPIE | Not applicable | 10/04/2020 | AT 283 | 2% |
| Thermocouple type "T" | ITALCOPPIE | Not applicable | 10/04/2020 | AT 284 | 2% |
| Thermocouple type "T" | ITALCOPPIE | Not applicable | 10/04/2020 | AT 285 | 2% |
| Thermocouple type "T" | ITALCOPPIE | Not applicable | 10/04/2020 | AT 286 | 2% |
| Thermocouple type "T" | ITALCOPPIE | Not applicable | 10/04/2020 | AT 287 | 2% |
| Thermocouple type "T" | ITALCOPPIE | Not applicable | 10/04/2020 | AT 288 | 2% |
| Thermocouple type "T" | ITALCOPPIE | Not applicable | 10/04/2020 | AT 289 | 2% |
| Digital multimeter | AGILENT | MY53205896 | 11/09/2019 | AT 229 | 1% |
| Data logger | AGILENT | MY49022503 | 28/01/2022 | | 1% |
| Conductivity meter | HANNA INSTRUMENT | Not applicable | 06/03/2020 | AT 162 | 2% |
| Power supply salt fog | SPECIALTRASFO | Not applicable | 17/04/2020 | AT 301 | 3% |
| Meteological Station | FISCHER | Not applicable | 10/03/2020 | AT 161 | 3% |


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EXAMPLE OF IMPULSE WAVE SHAPE

Ambient temperature: 20°C / Humidity: 60 % / Air pressure: 976hPa



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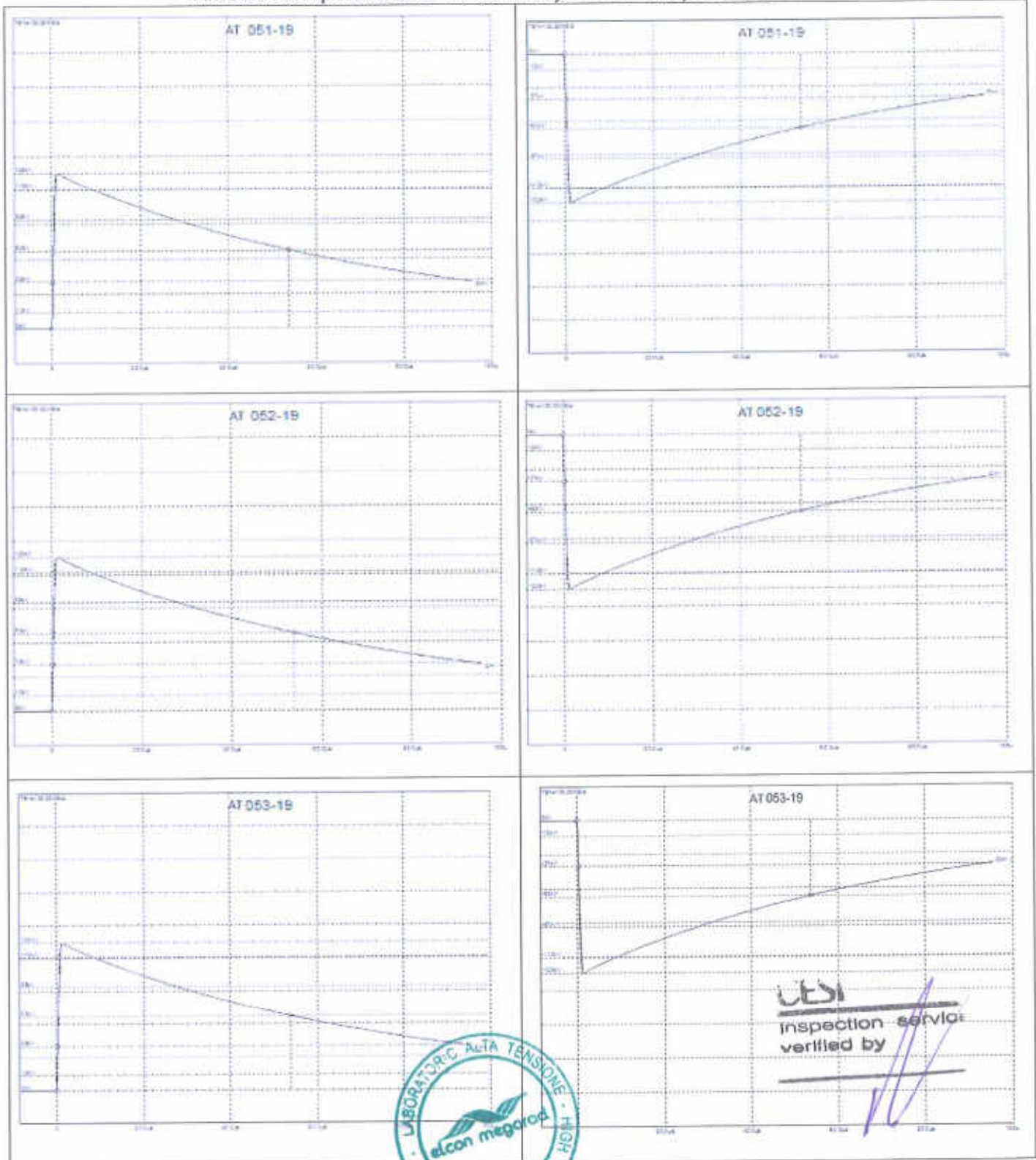
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EXAMPLE OF IMPULSE WAVE SHAPE

Ambient temperature: 22°C / Humidity: 49% / Air pressure: 981hPa



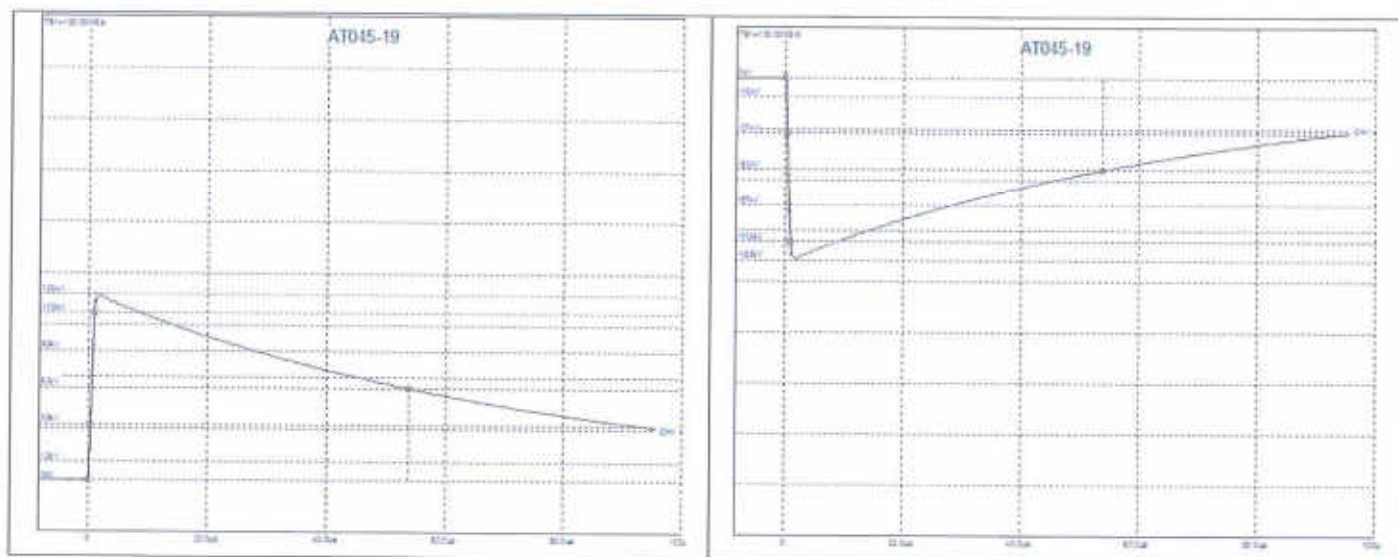
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EXAMPLE OF IMPULSE WAVE SHAPE

Ambient temperature: 20°C / Humidity: 60 % / Air pressure: 976hPa



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TEST CONFIGURATION

AC -TEST



PD -TEST



IMPULSE -TEST



WET -TEST

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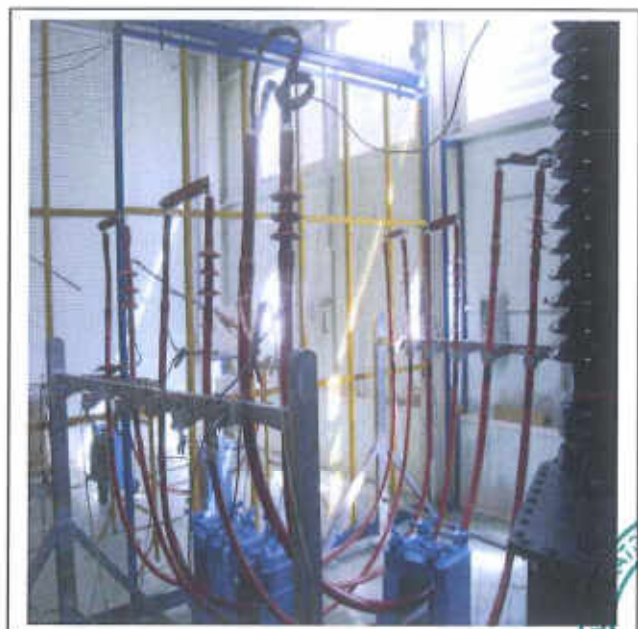
IMMERSION -TEST



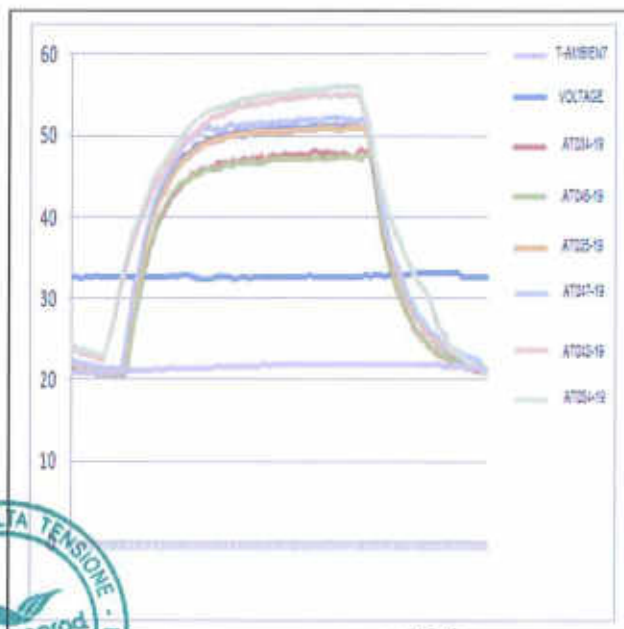
SALT FOG -TEST



HEATING CYCLE IN AIR -TEST



**DIAGRAMS FOR
HEATING CYCLE IN AIR -TEST**



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CONFIGURATION FOR ASSEMBLY



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