TEST REPORT

N° 439A_15

The test results can be applied only to the tested objects.

Prepared by: Eng. P. Marino

Approved by: Mr. F. Portas

elcon megarad S.p.A.
UFFICIO TECNICO

Report n°:	439A/15	**Date:** 03/02/2015
Customer:	**Elcon Megarad SpA**	
Place:	ELCON MEGARAD S.p.a. - H.V. Laboratory – Via Nazionale 110 Arcella (AV) ITALY	
Testing date:	07/01/2015 ÷ 02/02/2015	

	Type:	**Drawing:**
OBJECTS:	ELCOTERM TIS - 5282/ E-R ELCOTERM GLS - 5285/ E- R ELCOTERM TES - 5284/ E- R	910/E 916/E 912/E

DESCRIPTION:	**SINGLE CORE HEAT SHRINKABLE INDOOR TERMINATION** **SINGLE CORE HEAT SHRINKABLE JOINT** **SINGLE CORE HEAT SHRINKABLE OUTDOOR TERMINATION**
VOLTAGE:	U_0/U = 26/45kV (U_{max} 52kV)
CABLE & SECTION:	1x240 sqmm AL/XLPE/PVC
REFERENCE STANDARD:	IEC 60840 TAB. C.1
TEST METHODS:	IEC (60811-1-1; 60230; 60840; 60885-3)
RESULTS:	**The tested objects are in accordance with the reference Standard.**

ELCON MEGARAD H.V. Lab. Responsible:	Eng. P. Marino	Megarad S.p.A. UFFICIO TECNICO
Test Operator:	Mr. F. Lombardo	Lombardo
Technical Director:	Mr. F. Portas	

This report consist of:	8 Pages

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Lombardo	LABORATORIO ALTA TENSIONE elcon megarad S.p.A.

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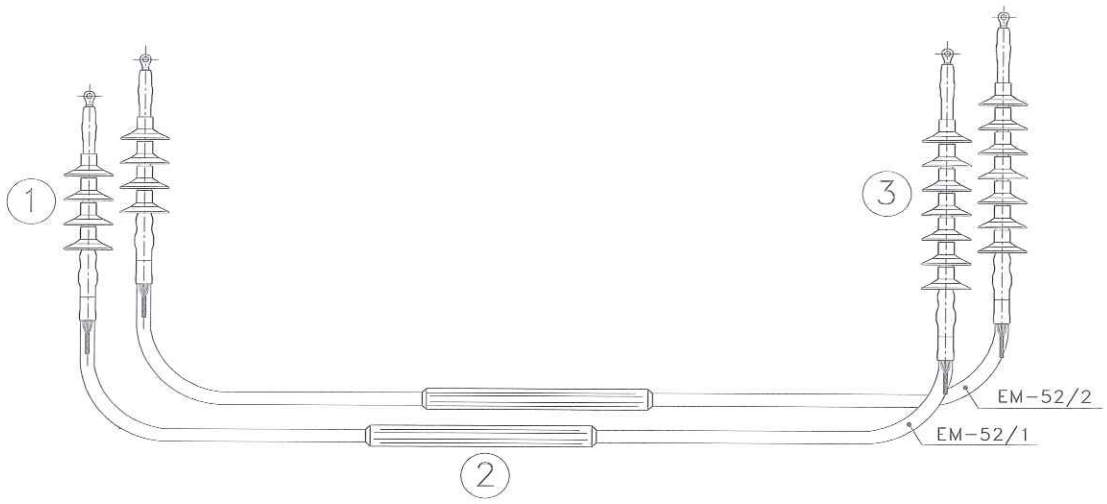
COMPONENTS CONTROL
ACCESSORIES ASSEMBLING CONTROL

- N° 2 MEDIUM VOLTAGE SINGLE CORE CABLE LINE, EM-52/1 AND EM-52/2 HAVE BEEN ASSEMBLED BY ELCON MEGARAD OPERATOR, WITH 3 ACCESSORIES ACCORDING TO THE INSTALLATION INSTRUCTION AS FOLLOWS:

COMPOSITION OF THE SINGLE CORE CABLE LINE — **Date: 07/01/15**

Line	Cables	Indoor Termination	Joint	Outdoor Termination
EM-52/1	1x240 sqmm AL/XLPE/PVC	(1) ELCOTERM TIS 5282/E-R	(2) ELCOTERM GLS 5285/E-R	(3) ELCOTERM TES 5284/E-R
EM-52/2	1x240 sqmm AL/XLPE/PVC	(1) ELCOTERM TIS 5282/E-R	(2) ELCOTERM GLS 5285/E-R	(3) ELCOTERM TES 5284/E-R

Line Drawing:
(indicative scheme of the 2 single core cable line 26/45 (52)kV)



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TEST SEQUENCE

IEC 60840 TAB. 4

N°	TEST	TEST REQUIREMENTS	Test Voltage [kV] 26/45(52) kV
01	Measurement of thickness of cable insulation	According to clause 10.6	--
02	Partial discharge at ambient temperature	Max 5pC at 1,5 U_0	39
03	Electrical heat cycling in air	20 cycles at $2U_0$	52
04	Partial discharge at ambient temperature	Max 5pC at $1,5U_0$	39
05	Impulse voltage at ambient temperature	10 impulses of each polarity	250 peak
06	A.C. voltage dry withstand	30 minutes at $2,5U_0$	65
07	Examination	For information only	---
Notes			

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TEST 01	Measurement of thickness of cable insulation	
OK	LINE:	EM-52/1 - EM-52/2
	The measurement of thickness of cable insulation is compliant with IEC 60840 , clause 10.6.	Date: 07/01/2015

TEST 02	Partial discharge at ambient temperature Max 5pC at $1,5U_0$			
OK	Applied Voltage:	39kV*		45,5kV**	
		EM-52/1	EM-52/1	EM-52/2	EM-52/2
	Partial discharge level [pC]	0,5	1,0	2,0	1,5
	RESULT:	Partial discharge measurement, referring to 2 steps above mentioned is always less than the maximum required.			
	Note: The PD measurement has been performed on each single cable at 25°C. The TETTEX PD measurement bridge has been calibrated to 10pC. * = measurement at $1,5U_0$ ** = measurement at $1,75U_0$			Date: 07/01/2015	

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TEST 03	Electrical heat cycling in air 20 cycles at $2U_0$		
OK	Line:	EM-52/1 - EM-52/2	
	Applied Voltage:	52kV	
	Loading Current	Approx 595 A	
	Number of cycles:	20	
	RESULT:	No flashovers or breakdowns	
	The heating shall be applied for at least 8 h , the conductor temperature shall be maintained within the stated temperature limits for at least 2 h of each heating period and followed by at least 16 h of natural cooling to a conductor temperature less than or equal to ambient temperature.	Date Start : 08/01/2015 Date End : 29/01/2015	

TEST 04	Partial discharge at ambient temperature Max 5pC at $1,5U_0$			
OK	Applied Voltage:	39kV*		45,5kV**	
		EM-52/1	EM-52/1	EM-52/2	EM-52/2
	Partial discharge level [pC]	0,5	1,5	1,5	2,0
	RESULT:	Partial discharge measurement, referring to 2 steps above mentioned is always less than the maximum required.			
	Note: The PD measurement has been performed on each single cable at 25°C. The TETTEX PD measurement bridge has been calibrated to 10pC. * = measurement at $1,5U_0$ ** = measurement at $1,75U_0$	Date: 30/01/2015			

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TEST 05	Impulse voltage at elevated temperature 10 impulses for each polarity																			
OK	Applied voltage		250kV																	
			Positive Polarity – 10 shots									Negative Polarity – 10 shots								
	Line:	EM 52/1	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
		EM 52/2	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	RESULT:		No flashovers or breakdowns									No flashovers or breakdowns								
	Note: T_{amb}= 27°C, P = 785mmHg, Relative Humidity = 60% The test has been performed on each single core,											Date: 02/02/2015								

TEST 06	A.C. voltage dry withstand 30 minutes at $2,5U_0$		
OK	LINE:	EM-52/1 - EM-52/2	
	Applied Voltage:	65 kV	
	Testing time:	30 min	
	RESULT:	No flashovers or breakdowns	
	Note: The AC test has been performed on each single core with AC HV transformer.		Date: 02/02/2015

TEST 07	Examination		
OK	LINE:	EM-52/1 – EM-52/2	
	RESULT:	The accessories do not show obvious signs of damage or premature aging of materials. No leakage of mastic sealants from the upper and lower ends of the terminations and by the extremities of the joints. On the no-tracking sleeves of each terminations and on the rain sheds, no signs of electrical activity are observed.	
	Note:		Date: 02/02/2015

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APPENDIX 1

TEST EQUIPMENT

DC TEST:

- DC GENERATOR: AT 128

AC TEST:

- POWER SUPPLY: AT 019
- VARIAC: AT 006
- HV TRANSFORMER: AT 010
- VOLTMETER: AT 176

PARTIAL DISCHARGE MEASUREMENT:

- POWER SUPPLY: AT 019
- VARIAC: AT 006
- HV TRANSFORMER: AT 010
- VOLTMETER: AT 176
- PARTIAL DISCHARGE BRIDGE: AT 013
- OSCILLOSCOPE: AT 011
- PD CALIBRATOR: AT 017
- HV COUPLING CAPACITY: AT 101

IMPULSE TEST:

- POWER SUPPLY: AT 004
- IMPULSE GENERATOR: AT 001
- OSCILLOSCOPE: AT 160
- IMPULSE DIVIDER: AT 169 + AT 170 + AT 175

ELECTRICAL HEATING CYCLES:

- POWER SUPPLY: AT 146
- VARIAC: AT 152
- HV TRANSFORMER: AT 148
- VOLTMETER: AT 176
- CURRENT GENERATOR: AT 024 + AT 022 + AT 123
- CURRENT TRANSFORMER: AT 026
- CURRENT TRANSDUCER: AT 083
- VOLTAGE TRANSDUCER: AT 054
- AMPEROMETER: AT 045
- TERMOMETER AT 099
- TERMOCOUPLE TYPE T: AT 184 + AT 185

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