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IEC 63294

TEST METHODS FOR ELECTRIC CABLES WITH RATED VOLTAGES UP TO AND INCLUDING 450/750 V

Program: SQ-2544.V7

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1. FOREWORD

This report summarizes the results of the **SQ-2544.V7** proficiency testing program on the verification of test methods for electric cables with rated voltages up to and including 450/750 V. This program is conducted in a bilateral format, following the “split-sample” design described in clause A.4.2 of ISO/IEC 17043: 2023 (Alternative interlaboratory comparisons).

South Quality conducted the testing program in July 2026 with the aim of assessing the laboratory's ability to competently perform the designated tests.

2. ORGANIZATION

Program Coordinator: Eng. Esteban Di Marco

Assistant Technician: Valentyn Kravchenko

Statistics: Lic. Manuel Tozaki

Supervision: Eng. Emiliano Medina

3. OBJECTIVE

The objective of this proficiency testing program is to verify the following electrical test method:

- Insulation resistance

The test method was verified in accordance with the following standard:

Standard
IEC 63294: 2021

To verify this, batches of cable samples were selected.

Participants in this program have not been previously informed about the expected values or value ranges of the samples they receive.

4. PARTICIPANT

Company: **ELAND CABLES**

Country: United Kingdom

Client ID: E485

Contact person: Denham Gilday
 Laboratory Manager
dgilday@elandcables.com

5. HOMOGENEITY

Several batches were prepared identically by the staff at South Quality.

Subsequently, a homogeneity study was conducted with an ISO 17025 accredited laboratory.

The control process followed ISO 33405: 2024, clauses 7.4.1.1 / 7.4.1.2. Stratified random sampling was applied, and samples were selected using random number generation software.

The results of this test are presented below:

Size of each batch: **50 units**

Tested samples from each batch: **10 units**

DETERMINATION	HOMOGENEITY OF RESULTS IN THE ANALYZED SAMPLES		
	BATCH: LEM2991	BATCH: LEM2992	BATCH: LEM2993
Insulation resistance 450V / 70°C (Cl. 5.4)	NO	YES	YES

DETERMINATION	HOMOGENEITY OF RESULTS IN THE ANALYZED SAMPLES		
	BATCH: LEM3127	BATCH: LEM3128	BATCH: LEM3129
Insulation resistance 450V / 70°C (Cl. 5.4)	YES	YES	YES

DETERMINATION	HOMOGENEITY OF RESULTS IN THE ANALYZED SAMPLES		
	BATCH: LEM3268	BATCH: LEM3269	BATCH: LEM3270
Insulation resistance 450V / 70°C (Cl. 5.4)	YES	YES	NO

Samples for this program are taken from the selected batches identified as **LEM2992**, **LEM3127** and **LEM3269**.

For the indicated batches, the values determined in the homogeneity study are utilized as the assigned values.

The analysis of the test data indicated that the selected samples exhibited sufficient homogeneity for the program. Therefore, the results of participants identified as outliers cannot be attributed to sample variability.

6. SAMPLE INFORMATION

The following samples were sent for testing:

Batch:	LEM2992
Sample ID:	09
Characteristics:	Single core PVC (Green/Yellow) - 2.5 mm ² - 10m

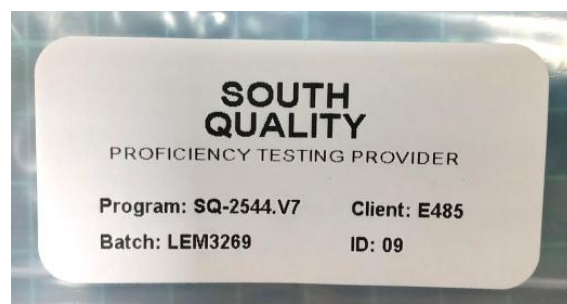
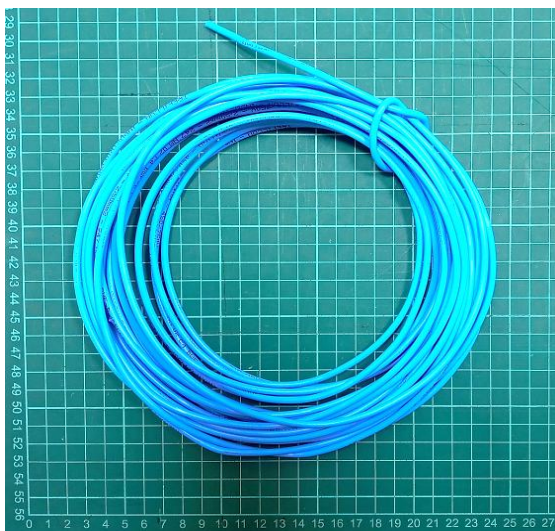
Batch:	LEM3127
Sample ID:	06
Characteristics:	Single core PVC (Light blue) - 2.5 mm ² - 10m

Batch:	LEM3269
Sample ID:	09
Characteristics:	Single core PVC (Red) - 2.5 mm ² - 10m

7. IMAGES



SAMPLES



8. ASSIGNED VALUES

BATCH	INSULATION RESISTANCE (450V DC / 70°C)	
	MΩ.km	SD
LEM2992	9050	195
LEM3127	9250	165
LEM3269	20050	390

9. PARTICIPANT RESULTS (SEE APPENDIX)

CODE	INSULATION RESISTANCE (250 V / 70°C) (MΩ.km)
LEM2992-09	8680
LEM3127-06	9180
LEM3269-09	19320

10. STATISTICS

The results must be treated as quantitative.

According to B.4.1.3 of ISO 17043 the appropriate technique is to compare participant results with the assigned values. The results can be compared using **z score**.

$$z = \frac{x - X}{\hat{\sigma}}$$

x is the participant's result

X is the assigned value

$\hat{\sigma}$ is the standard deviation

The performance evaluation of each sample is carried out with the following criteria:

$|z| \leq 2.0$ indicates “satisfactory” performance and generates no signal;

$2.0 < |z| < 3.0$ indicates “questionable” performance and generates a warning signal;

$|z| \geq 3.0$ indicates “unsatisfactory” performance and generates an action signal;

11. EVALUATION OF PERFORMANCE

BATCH	INSULATION RESISTANCE (70°C) (MΩ.km)		z score	PERFORMANCE RESULT
	PARTICIPANT RESULT	ASSIGNED VALUE		
LEM2992	8680	9050	1.90	SATISFACTORY
LEM3127	9180	9250	0.42	SATISFACTORY
LEM3269	19320	20050	1.87	SATISFACTORY

12. CONCLUSIONS

The overall performance on this **SQ-2544.V7** program from the participant laboratory **ELAND CABLES**, is **SUFFICIENT** based on expected results.

The criteria used for evaluating the overall performance are as follows:

- **SUFFICIENT** performance: No unsatisfactory/questionable results were obtained.
- **ALMOST SUFFICIENT** performance: No unsatisfactory results were obtained, but one questionable result was found.
- **INSUFFICIENT** performance: An unsatisfactory result was obtained, or two questionable results were obtained.

APPENDIX

PARTICIPANT RESULTS

(Results form)



INSTRUCTIONS

PROGRAM:	Test methods for electric cables with rated voltages up to and including 450/750 V
CODE:	SQ-2544
VERSION:	7
STANDARD:	IEC 63294
COORDINATOR:	Eng. Esteban Di Marco (edimarco@ptsouthquality.com)

1 - General

This document serves as a guide for managing the results of the **SQ-2544.V7** program.

2 - Standard

IEC 63294: 2021

3 - Tests involved

TEST	PARAMETERS TO DETERMINE
Verification of test methods for electric cables with rated voltages up to and including 450/750 V	Clause 5.4

4 - Samples

CODE	SAMPLE	QUANTITY
LEM2992-09	Single core PVC (Green/Yellow) - 2.5 mm ²	10 m
LEM3127-06	Single core PVC (Light blue) - 2.5 mm ²	10 m
LEM3269-09	Single core PVC (Red) - 2.5 mm ²	10 m

5 - Notes

- Being a bilateral program, there is no deadline for submitting results.
- The participant must submit the results using the usual report employed by their laboratory.
- The samples are to be handled as routine lab samples, with all testing, documentation, and reporting adhering to **IEC 63294**.
- Samples must be retained until the end of the program, which concludes with the submission of the final report.
- To review the results, test images would be appreciated. Images can be attached at the end of this document or sent by email.

6 - Test conditions

PARAMETER	CONDITION
Temperature	70 °C

PHOTOGRAPHS

Test Parameters

Cables – IEC02 – IEC 60227-3 :1993+A.1:1997 (CI 5)

Test method IEC63294:2021 (CI 5.4)

Sample length – 5m

DC Voltage applied between 80V and 500V – (Samples tested at 250V), insulation resistance measured after 1 minute of application of the voltage

Immersion time 2hrs – IEC60227-1:2024 (Table 3 ref 4.1)

Temperature 70°C – IEC60227-1:2024 (Table 3 ref 4.1) as above

Minimum insulation resistance 0.009 MΩ/km IEC 60227-3 :1993+A.1:1997 (Table 3)

Test Results

Date	20/07/2026		
Identification	LEM2992-09 Single core PVC (Green/Yellow) - 2.5 mm2		
Material Type	PVC		
Standards	IEC 60227-3:2024 for use in conjunction with IEC 60227-1:2024, IEC 63294:2021		
Clause	Requirement + Test	Result - Remark	Verdict
Insulation resistance			
at 70°C MΩ km	0.009 min.	8680	Pass

Date	20/07/2026		
Identification	LEM3127-06 Single core PVC (Light blue) - 2.5 mm2		
Material Type	PVC		
Standards	IEC 60227-3:2024 for use in conjunction with IEC 60227-1:2024, IEC 63294:2021		
Clause	Requirement + Test	Result - Remark	Verdict
Insulation resistance			
at 70°C MΩ km	0.009 min.	9180	Pass

Date	20/07/2026		
Identification	LEM3269-09 Single core PVC (Red) - 2.5 mm2		
Material Type	PVC		
Standards	IEC 60227-3:2024 for use in conjunction with IEC 60227-1:2024, IEC 63294:2021		
Clause	Requirement + Test	Result - Remark	Verdict
Insulation resistance			
at 70°C MΩ km	0.009 min.	19320	Pass



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