

REPORT No 11504

Date of issue: December 29, 2025

Status: FINAL REPORT

IEC 60811-412

ELECTRIC AND OPTICAL FIBRE CABLES THERMAL AGEING METHODS - AGEING IN AN AIR BOMB -

Program: SQ-2612.V2

This document is issued by the Company subject to its Terms and Conditions, available on request or accessible at <https://www.ptsouthquality.com/terms-and-conditions>. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Copyright © 2024 South Quality, Buenos Aires, ARGENTINA



Prepared by:	Reviewed by:	Approved by:
Valentyn Kravchenko Assistant Technician	Eng. Esteban Di Marco Electromechanical expert	Eng. Emiliano Medina Quality Assurance Lead

TABLE OF CONTENTS

1. FOREWORD	3
2. ORGANIZATION	3
3. OBJECTIVE	3
4. PARTICIPANT	3
5. HOMOGENEITY	4
6. SAMPLE INFORMATION	4
7. IMAGES	5
8. ASSIGNED VALUES	5
9. PARTICIPANT RESULTS	6
10. STATISTICS	6
11. EVALUATION OF PERFORMANCE	7
12. CONCLUSIONS	7
APPENDIX	
PARTICIPANT RESULTS (INSTRUCTIONS)	8

1. FOREWORD

This report summarizes the results of the **SQ-2612.V2** proficiency testing program on the determination of the mechanical properties on pieces obtained directly after ageing in an air bomb. This program is conducted in a bilateral format, following the A.3.3 classification of the ISO 17043 standard ("Split-sample testing schemes").

South Quality conducted the testing program in November 2025 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
 Statistic: Lic. Manuel Tozaki
 Supervision: Eng. Emiliano Medina

3. OBJECTIVE

The objective of this proficiency testing program is to determine the mechanical properties on pieces obtained directly after ageing in an air bomb, using the following standard:

Standard
IEC 60811-412: 2012

To verify this, batches of cables have been 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: LEM3249	BATCH: LEM3250	BATCH: LEM3251
T_U	YES	YES	YES
T_E	YES	NO	YES
E_U	YES	YES	YES
E_E	YES	NO	YES

Samples for this program are taken from the selected batch identified as **LEM3249**.

For the indicated batch, 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:	LEM3249
Sample ID:	05
Characteristics:	Power cable - 2 x 0.75 mm ² - 100 cm - 2 units

7. IMAGES



8. ASSIGNED VALUES

BATCH: LEM3249 - Brown				
	T_U (N/mm ²)	T_E (N/mm ²)	E_U (%)	E_E (%)
AVG	6.159	5.598	545.395	518.263
SD	0.356	0.425	21.752	24.566

BATCH: LEM3249 - Blue				
	T_U (N/mm ²)	T_E (N/mm ²)	E_U (%)	E_E (%)
AVG	6.592	6.814	519.256	528.356
SD	0.325	0.486	32.14	35.26

9. PARTICIPANT RESULTS (SEE APPENDIX)

CODE: LEM3249-05 - Brown				
	T_U (N/mm ²)	T_E (N/mm ²)	E_U (%)	E_E (%)
AVG	6.209	5.667	538.581	508.309

CODE: LEM3249-05 - Blue				
	T_U (N/mm ²)	T_E (N/mm ²)	E_U (%)	E_E (%)
AVG	6.656	6.919	511.017	523.720

10. STATISTICS

The results must be treated as quantitative.

The comparison is made according B.3.1.3 of ISO 17043 and the appropriate technique is to compare participant results with the assigned values. The results can be compare using percent difference 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	PARAMETER	AVERAGE		z score	PERFORMANCE RESULT
		PARTICIPANT RESULT	ASSIGNED VALUE		
LEM3249 Brown	T_U (N/mm ²)	6.209	6.159	0.14	SATISFACTORY
	T_E (N/mm ²)	5.667	5.598	0.16	SATISFACTORY
	E_U (%)	538.581	545.395	0.31	SATISFACTORY
	E_E (%)	508.309	518.263	0.41	SATISFACTORY
LEM3249 Blue	T_U (N/mm ²)	6.656	6.592	0.20	SATISFACTORY
	T_E (N/mm ²)	6.919	6.814	0.22	SATISFACTORY
	E_U (%)	511.017	519.256	0.26	SATISFACTORY
	E_E (%)	523.720	528.356	0.13	SATISFACTORY

12. CONCLUSIONS

The overall performance on this **SQ-2612.V2** program from the participant laboratory **ELAND CABLES**, is **SUFFICIENT** based on expected results.

The criteria used for the evaluation of the overall performance is the following:

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

APPENDIX

PARTICIPANT RESULTS

(Instructions)



INSTRUCTIONS

PROGRAM:	Electric and optical fibre cables Thermal ageing methods - Ageing in an air bomb
CODE:	SQ-2612
VERSION:	2
STANDARD:	IEC 60811-412
COORDINATOR:	Eng. Esteban Di Marco (edimarco@ptsouthquality.com)

1 - General

This document serves as a guide for managing the results of the **SQ-2612.V2** program.

2 - Standard

IEC 60811-412: 2012

3 - Tests involved

TEST
Determination of the mechanical properties on pieces obtained directly after ageing in an air bomb ($V_f + V_E$)

4 - Samples

CODE	SAMPLE	QUANTITY
LEM3249-05	Power cable - 2 x 0.75 mm ² - 100 cm	2

5 - Notes

- a) Being a bilateral program, there is no deadline for submitting results.
- b) The participant must submit the results using the usual report employed by their laboratory.
- c) The samples should be treated as routine laboratory samples. All testing, recording, and reporting must be performed in accordance with IEC 60811-412.
- d) The remaining samples must be retained until the program concludes with the submission of the final report.
- e) To review the results, test images would be appreciated. Images can be attached at the end of this document or sent by email.

PHOTOGRAPHS

Air Bomb Test Results

Date	18/11/2025				
Identification	LEM3249-05				
Material Type	IEC53 Insulation - IE4				
Standards	IEC 60245-4:2011 in conjunction with IEC 60245-1:2003, AMD1:2007 and IEC 60245-2:1994, AMD1:1997, AMD2:1997 IEC 63294:2021 IEC 60811-412:2012				
Clause	Requirement + Test	Result - Remark	Result - Remark	Verdict	
		Brown	Blue		
MECHANICAL PROPERTIES OF INSULATION					
Before ageing					
TS	N/mm ²	5,0 min.	6.209	6.656	Pass
EB	%	200 min.	538.581	511.017	Pass
After ageing in air bomb, 40 h 127°C					
TS	N/mm ²	-	5.667	6.919	N/A
EB	%	-	508.309	523.72	N/A
Difference					
TS	%	±30 max.	-8.73	3.95	Pass
EB	%	±30 max.	-5.62	2.49	Pass

Air Bomb Test Equipment



Tensile and Elongation Test Equipment



----- END OF REPORT -----