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IEC 60332-1-2

TESTS ON ELECTRIC AND OPTICAL FIBRE CABLES UNDER FIRE CONDITIONS - TEST FOR VERTICAL FLAME PROPAGATION - 1 KW PRE-MIXED FLAME -

Program: SQ-2619

****

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1. FOREWORD

This report summarizes the results of the **SQ-2619** proficiency testing program for determining cable resistance to vertical flame propagation. 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 September 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 maximum zone of charring using the following standard:

Standard
IEC 60332-1-2: 2004 + AMD1: 2015

To verify this, batches of cables have been selected.

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

4. PARTICIPANT

Company:	**ELECTRIC PRODUCTS CERTIFICATION INDEPENDENT BODY - OICPE**
Laboratory:	**TESTING LABORATORY FOR ELECTRICAL PRODUCTS CERTIFICATION - LICPE**
Country:	Romania
Client ID:	E478
Contact person:	Razvan Neacsu Quality Manager razvan.neacsu@oicpe.ro

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: **75 units** Tested samples from each batch: **15 units**

DETERMINATION	HOMOGENEITY OF RESULTS IN THE ANALYZED SAMPLES		
	BATCH: LEM2955	BATCH: LEM2956	BATCH: LEM2957
CHARRING LENGTH	YES	YES	NO

Size of each batch: **75 units** Tested samples from each batch: **15 units**

DETERMINATION	HOMOGENEITY OF RESULTS IN THE ANALYZED SAMPLES		
	BATCH: LEM3374	BATCH: LEM3375	BATCH: LEM3376
CHARRING LENGHT	NO	YES	YES

Samples for this program are taken from the selected batches identified as **LEM2955** and **LEM3376**.

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:	LEM2955
Sample ID:	05 + 26 + 42
Characteristics:	Round cable - 2 x 1 mm^2 - Cu/PVC - 100 cm

Batch:	LEM3376
Sample ID:	08 + 29 + 46
Characteristics:	Round cable - 2 x 1.5 mm^2 - Cu/PVC - 100 cm

7. IMAGES

SAMPLES

8. ASSIGNED VALUES

BATCH	Distance between: LOWER edge of carbonization / LOWER edge of top support		Distance between: TOP edge of carbonization / LOWER edge of top support	
	AVG - LENGTH (mm)	SD	AVG - LENGTH (mm)	SD
LEM2955	501	2.8	366	2.5
LEM3376	498	2.6	379	2.6

9. PARTICIPANT RESULTS (SEE APPENDIX B)

BATCH	Distance between: LOWER edge of carbonization / LOWER edge of top support	Distance between: TOP edge of carbonization / LOWER edge of top support
	AVG - LENGTH (mm)	AVG - LENGTH (mm)
LEM2955	497	363
LEM3376	495	377

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	Distance between: LOWER edge of carbonization / LOWER edge of top support AVG - length (mm)		| z score |	PERFORMANCE RESULT
	PARTICIPANT RESULT	ASSIGNED VALUE		
LEM2955	497	501	**1.43**	**SATISFACTORY**
LEM3376	495	498	**1.15**	**SATISFACTORY**

BATCH	Distance between: TOP edge of carbonization / LOWER edge of top support AVG - length (mm)		| z score |	PERFORMANCE RESULT
	PARTICIPANT RESULT	ASSIGNED VALUE		
LEM2955	363	366	**1.20**	**SATISFACTORY**
LEM3376	377	379	**0.77**	**SATISFACTORY**

12. CONCLUSIONS

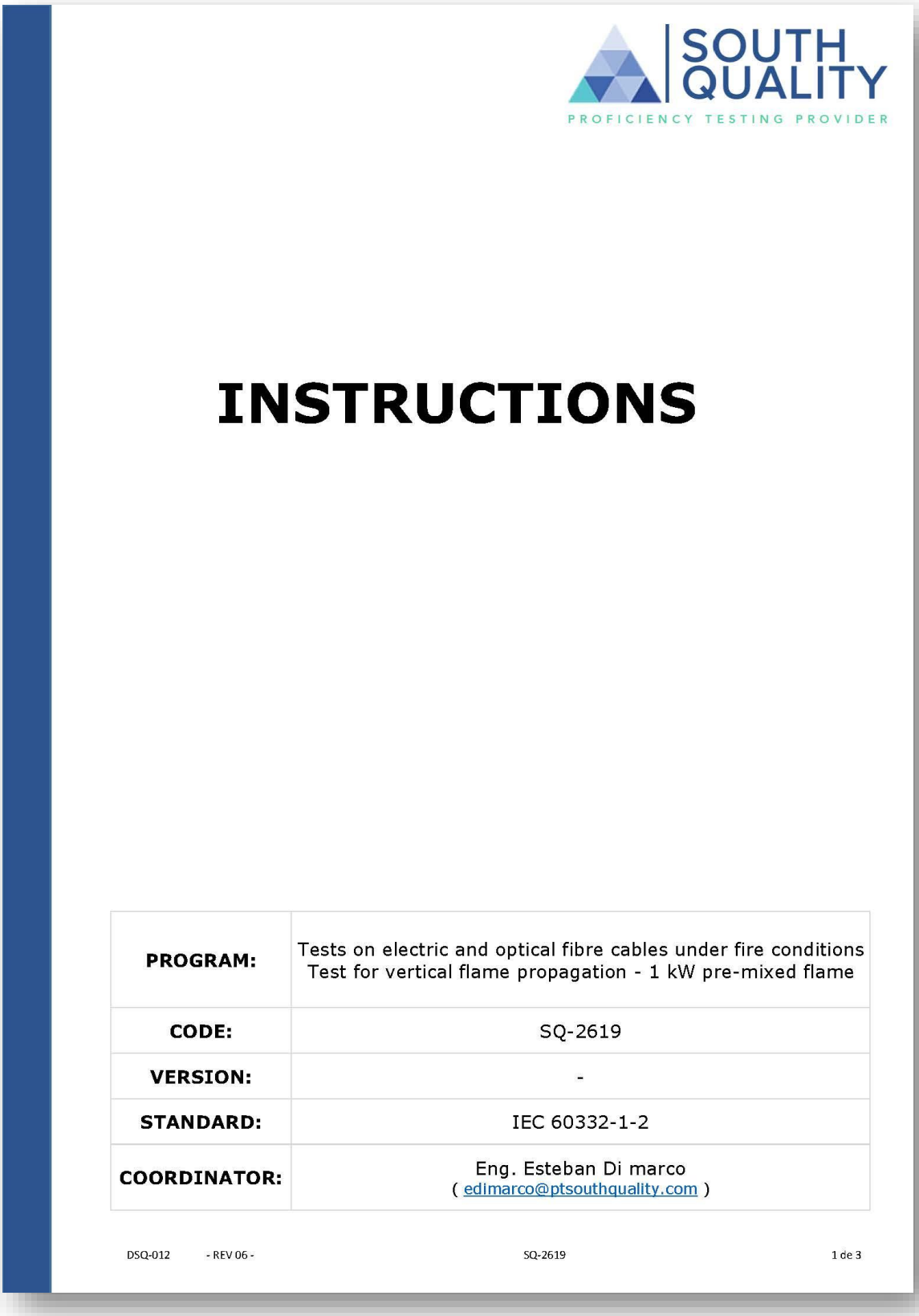
The overall performance on this **SQ-2619** program from the participant laboratory **ELECTRIC PRODUCTS CERTIFICATION INDEPENDENT BODY - OICPE - TESTING LABORATORY FOR ELECTRICAL PRODUCTS CERTIFICATION - LICPE**, is **SUFFICIENT** based on expected results.

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 or two questionable results were obtained.

APPENDIX A

INSTRUCTIONS



SOUTH QUALITY
PROFICIENCY TESTING PROVIDER

INSTRUCTIONS

PROGRAM:	Tests on electric and optical fibre cables under fire conditions Test for vertical flame propagation - 1 kW pre-mixed flame
CODE:	SQ-2619
VERSION:	-
STANDARD:	IEC 60332-1-2
COORDINATOR:	Eng. Esteban Di marco (edimarco@ptsouthquality.com)

DSQ-012 - REV 06 - SQ-2619 1 de 3

1 - General

This document serves as a guide for managing the results of the **SQ-2619** program.

2 - Standard

IEC 60332-1-2: 2004 + AMD1: 2015

3 - Tests involved

TEST
Determination of the resistance to vertical flame propagation

4 - Samples

CODE	SAMPLE	QUANTITY
LEM2955-XX	Round cable - 2 x 1 mm^2 - 100 cm	3
LEM3376-XX	Round cable - 2 x 1.5 mm^2 - 100 cm	3

5 - Notes

a) Being a bilateral program there is no deadline to accomplish sending results.
b) The participant must submit the results using the usual report employed by their laboratory.
c) Samples must be retained until the end of the program, which concludes with the submission of the final report.
d) To review the results, test images would be appreciated. Images can be attached at the end of this document or sent by email.

PHOTOGRAPHS

APPENDIX B

PARTICIPANT RESULTS (TEST REPORT # 298/2025)

OICPE
ELECTRIC PRODUCTS CERTIFICATION INDEPENDENT BODY
OICPE - ORGANISM INDEPENDENT PENTRU CERTIFICAREA PRODUSELOR ELECTRICE
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EUID : ROONRC.J2009003946401
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LICPE

LABORATORUL DE ÎNCERCĂRI PENTRU CERTIFICAREA PRODUSELOR ELECTRICE
Testing Laboratory for Electrical Products Certification

RAPORT DE ÎNCERCĂRI
TEST REPORT

No. 298 /27.01.2025
Pag. 1 / 9

Specimen no. 1 din 2

ÎNCERCAREA SOLICITATĂ Required Test	**Test on electric and optical fiber cables under fire conditions** **Test for vertical flame propagation on a cable (procedure for - 1kW pre-mixed flame) according to IEC 60332-1-2:2025**
PRODUSUL Equipment	**1) LEM2955-xx** **Round cable – 2 x 1 mm² – 100 cm** **2) LEM3376-xx** **Round cable – 2 x 1.5 mm² – 100 cm**
PRODUCĂTOR Manufacturer	**Unknown**
CLIENT (nume, adresă, cerere) Customer (name, address, order)	**PT SOUTH QUALITY SAS** Pareja 3981, Villa Devoto, Buenos Aires Argentina BILATERAL PT Scheme SQ-2619
MANAGER LABORATOR Laboratory Manager	**Eng. Răzvan NEACȘU**
DIRECTOR TEHNIC OICPE OICPE Technical Director	**Eng. Dragoș ROSMETENIUC**

Rezultatele încercărilor se referă numai la produsele încercate.
Acest document poate fi reprodus numai în întregime.

Test results refers only to tested products.
This document may be reproduced only in its entirety.

LICPE Cod PG-24-F-27

Ediția din 17.02.2025

PRODUCT TECHNICAL DATA:

1) LEM2955-xx

Round cable – 2 x 1 mm^2 – 100 cm

- number of conductors x nominal conductor cross-section – 2 x 1 mm^2

2) LEM3376-xx

Round cable – 2 x 1.5 mm^2 – 100 cm

- number of conductors x nominal conductor cross-section – 2 x 1.5 mm^2

Drum no.	: ----------
Product sort	: samples
Product reception date Testing period	: 08.08.2025 : 15 … 26.09.2025
Sampling method	: It is unknown. The client has selected the product submitted to test
Number of tested products	: 2 as follows: LEM2955-xx: 3 Samples (LEM2955-05, LEM2955-26 and LEM2955-42) LEM3376-xx 3 Samples (LEM3376-08, LEM3376-29 and LEM3376-46)

Tested by	**Eng. Gabriel CONSTANTINESCU**	

Article from DN	Requirement according to IEC 60332-1-2:2025	Results	Fullfill requirement
	Test method: IEC 60332-1-2:2025		
	Conditioning:		
	- temperature: (23±5) °C	24 °C	P
	- relative humidity: (50±20) %	55 %	P
	- duration: min. 16 h	24 h	P
	- measured samples diameter:	LEM2955-05: 6,8 mm; LEM2955-26: 6,7 mm; LEM2955-42: 6,7 mm	P
		LEM3376-08: 7,4 mm; LEM3376-29: 7,4 mm; LEM3376-46: 7,4 mm	P
	Test conditions:		
	- sample length: (600±25) mm	610 mm	P
	- time for flame application: (60±2) s	60 s	P
	Requirements:	**Results:**	
		LEM2955-05 / LEM2955-26 / LEM2955-42	
	- distance from the lower edge of upper horizontal support and the upper onset of charring: min. 50 mm	365 mm / 365 mm / 360 mm	P
	- distance from the lower edge of upper horizontal support and the lower onset of charring: max. 540 mm	505 mm / 495 mm / 490 mm	P
	- charring length: ≤ 425 mm	140 mm / 130 mm / 130 mm	P
		LEM3376-08 / LEM3376-29 / LEM3376-46	
	- distance from the lower edge of upper horizontal support and the upper onset of charring: min. 50 mm	375 mm / 370 mm / 385 mm	P
	- distance from the lower edge of upper horizontal support and the lower onset of charring: max. 540 mm	495 mm / 490 mm / 500 mm	P
	- charring length: ≤ 425 mm	120 mm / 120 mm / 115 mm	P

Fulfilling requirement: P – requirement is meet

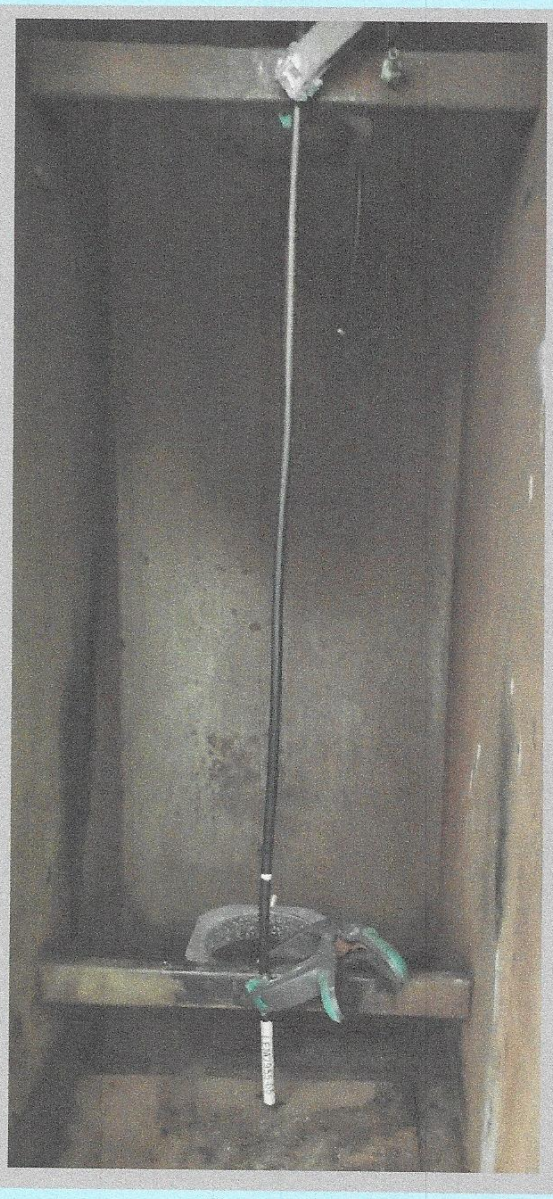
MEASUREMENT UNCERTAINTIES

Test name (TR art.)	Measured / calculated quantity	Measuring device / type /serial or inventory	Calibration certificate / issued by	Extended uncertainty [U]	Extension factor [k]
Test for vertical flame propagation on a cable (procedure for 1 kW pre-mixed flame)	sample length	Tape measure / 710P / MTM197987	23147-11.22 / METROMAT (LE 008)	1,5 mm	2
	sample diameter	Digital micrometer / 293-231-30 / 72771713	07220-03.2023 / METROMAT (LE008)	0,02 mm	2
	conditioning temperature	Climatic chamber / KPK1700 / 094-2006	24201-11.22 / METROMAT (LE 008)	0,5 °C	2
	conditioning relative humidity			2,5 %	2
	time	Digital stopwatch / DELTA E200 / M200473	01092-01.24 / METROMAT (LE 008)	0,4 s	2
	air flow	Flow controller (D) / D-6341-DR/W1521273B	BCC007/8940086 / 17.06.2025 Bronkhorst (RvAK 127)	0,1 l/min	2
	gas flow	Flow controller (D) / D-6321-DR/W1521273A	BCC002/894902 / 23.06.2025 Bronkhorst (RvAK 127)	10 ml/min	2
	charring length	uncertainty		2,5 mm	2

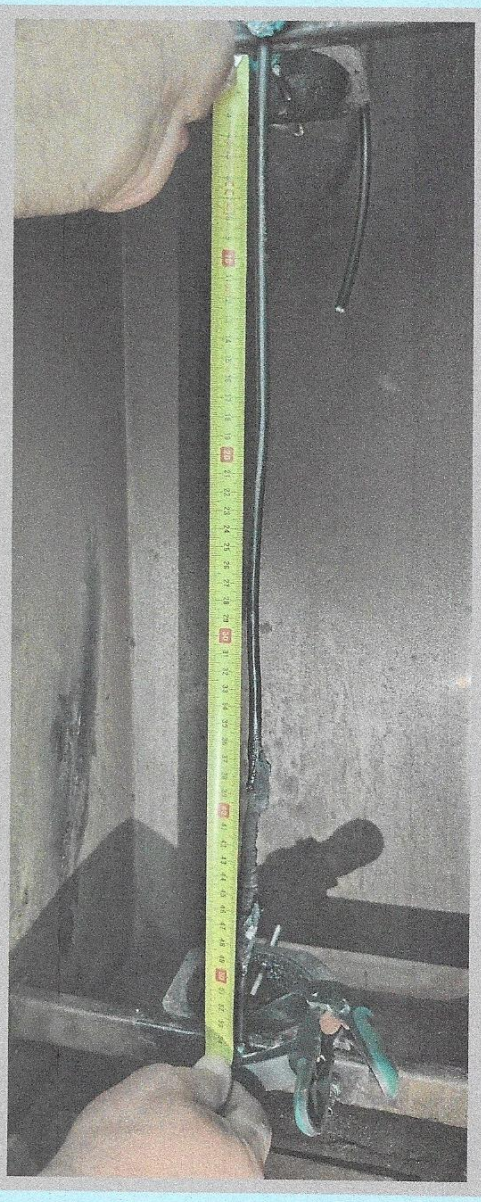
Note:
The uncertainty stated is the expanded uncertainty obtained by multiplying the standard uncertainty by the extension factor k = 2 and was determined in accordance with SR Ghid ISO/CEI 98-3:2010.
The measurand value lies within the assigned range of values with the probability of 95.45 %.

Article from DN	Requirement according to IEC 60332-1-2:2025	Results	Fullfill requirement

LEM2955-05



Before test

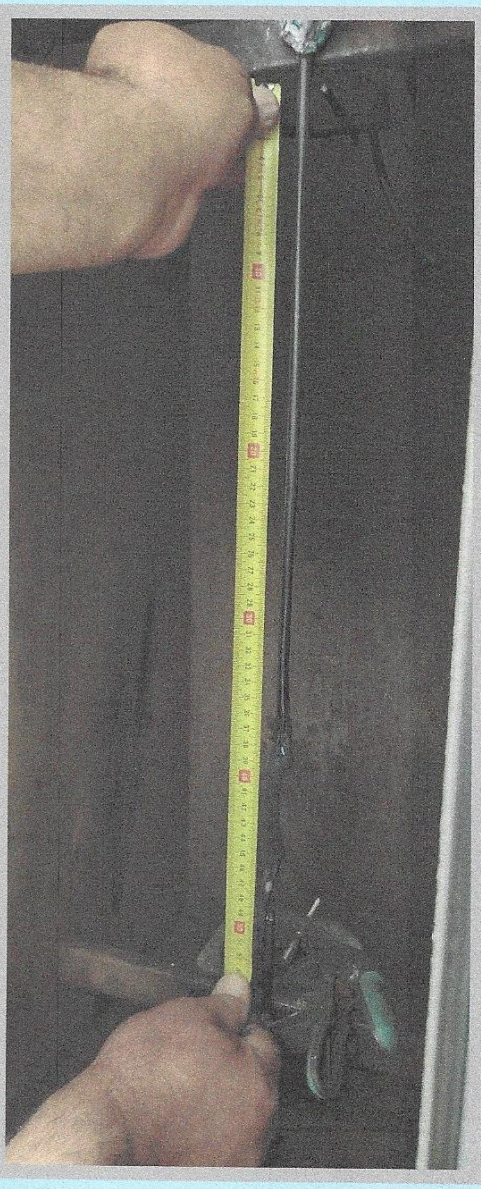


After test

Figure 1

LEM2955-26

Before test

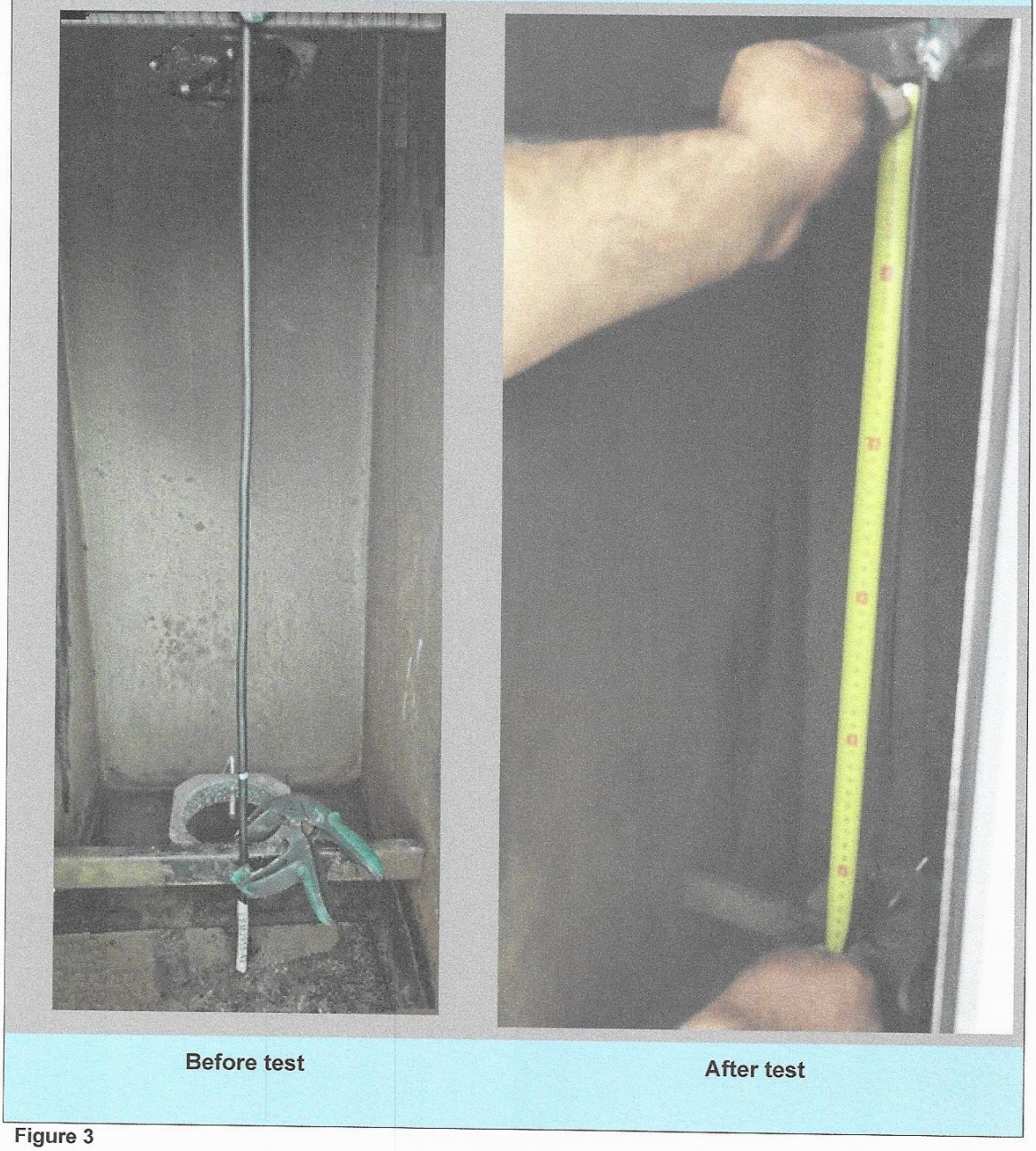


After test

Figure 2

Article from DN	Requirement according to IEC 60332-1-2:2025	Results	Fullfill requirement

LEM2955-26



Before test

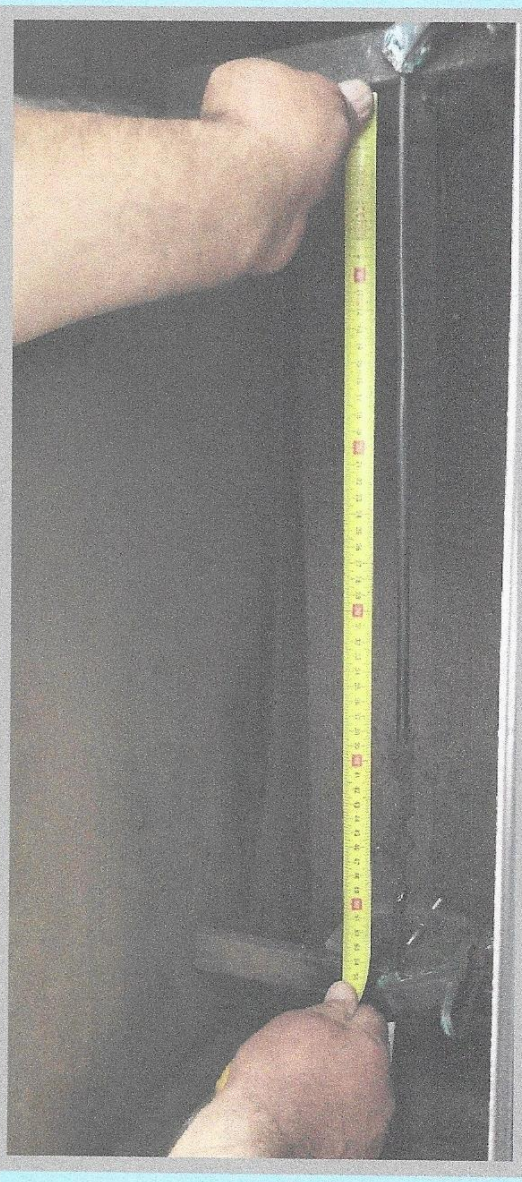
After test

Figure 3

Article from DN	Requirement according to IEC 60332-1-2:2025	Results	Fullfill requirement

LEM3376-08

Before test

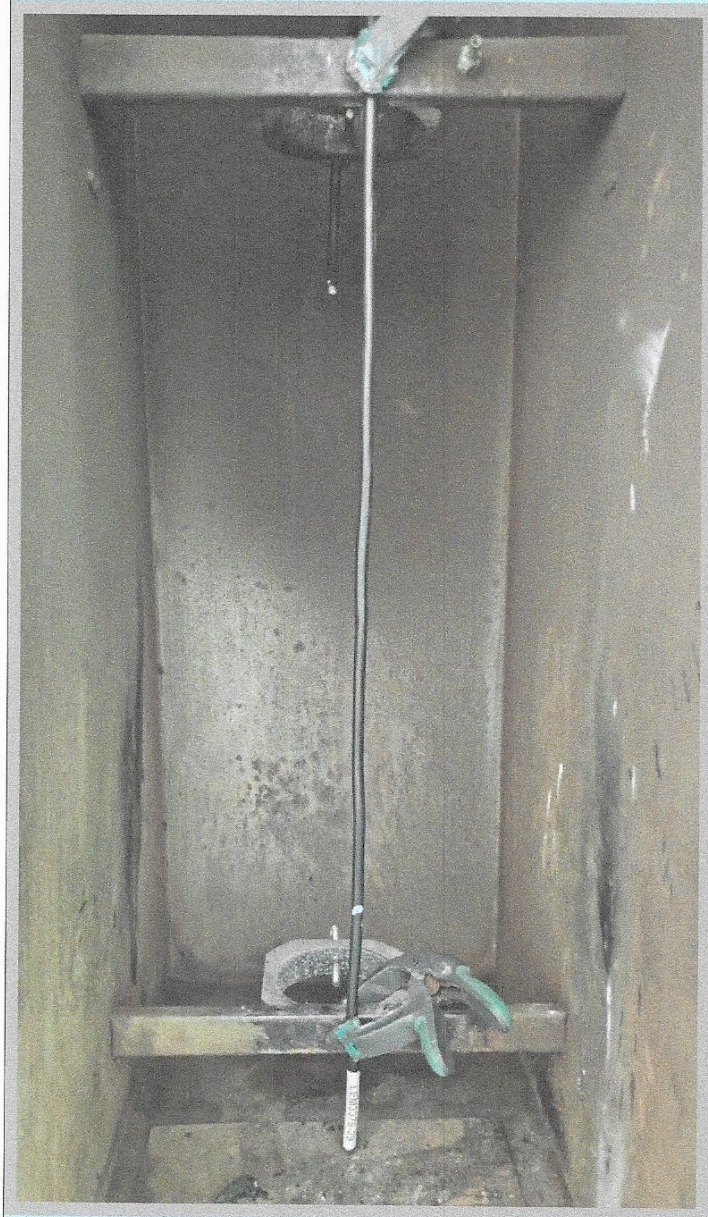


After test

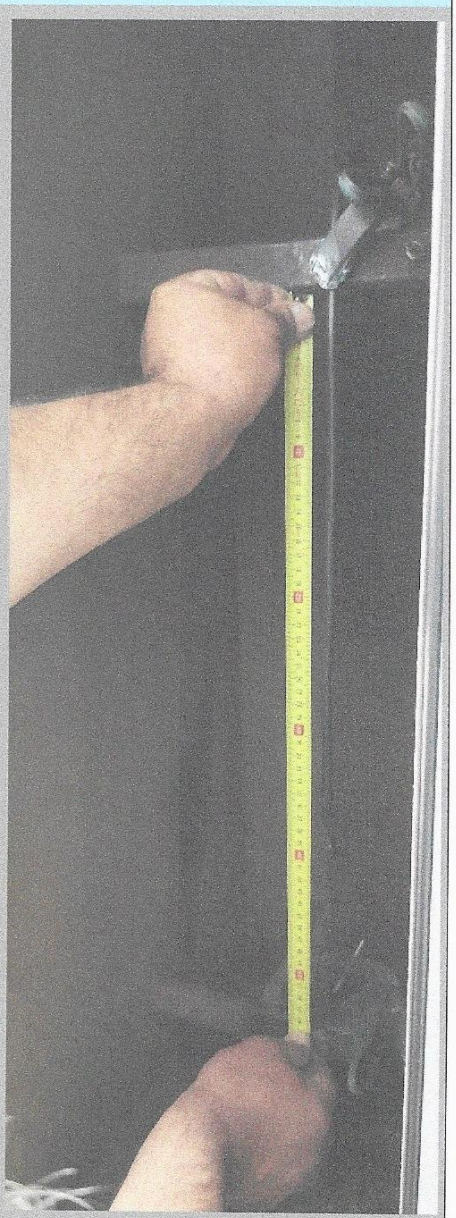
Figure 4

Article from DN	Requirement according to IEC 60332-1-2:2025	Results	Fullfill requirement

LEM3376-29



Before test



After test

Figure 5

LEM3376-46

Before test

After test

Figure 6

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