SOUTH QUALITY

PROFICIENCY TESTING PROVIDER

# REPORT No 11168

***Date of issue:*** *July 24, 2025*

***Status: FINAL REPORT***

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# IEC 60754-1

# DETERMINATION OF THE HALOGEN ACID GAS CONTENT

# Program: SQO-PL6 Round 10

**********



| Prepared by: | Reviewed by: | Approved by: |
|---|---|---|
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## 1. FOREWORD

This report summarizes the results of the **SQO-PL6 Round 10** proficiency testing program on the determination of amount of halogen acid gas emitted by burning cables. This program is carried out under a simultaneous participation format, according to the A.3.1 classification of the ISO 17043 standard ("Model 2 - Figure A.1").

**South Quality** conducted the testing program in May/June 2025. The aim of the program was to assess laboratory ability to competently perform the nominated tests.

## 2. ORGANIZATION

| | |
|---|---|
| Program Coordinator: | Eng. Erika Brest |
| Assistant Technician: | Mateo Giovanni |
| Statistic: | Lic. Manuel Tozaki |
| Supervision: | Eng. Emiliano Medina |

## 3. OBJECTIVE

The objective of this proficiency testing program is to determine the amount of halogen acid of cables.

This parameter is verified using the following standard:

| Standard |
|---|
| IEC 60754-1: 2019 |

For the verification of this, cables samples have been selected.

Participants in this program have not been previously informed of the values or range of values expected from the samples they receive.

## 4. PARTICIPANTS

In the present round, 20 laboratories have participated with the following details:

| CODE | Country | ISO 17025 Accredited | Results delivered |
|---|---|---|---|
| **01** | China | Yes | Yes |
| **02** | Colombia | Yes | No |
| **03** | France | Yes | Yes |
| **04** | Australia | Yes | Yes |
| **05** | Malaysia | Yes | Yes |
| **06** | Germany | No | Yes |
| **07** | France | Yes | Yes |
| **08** | Chile | No | No |
| **09** | Germany | Yes | Yes |
| **10** | South Africa | Yes | Yes |
| **11** | Italy | Yes | Yes |
| **12** | Mexico | Yes | Yes |
| **13** | Portugal | Yes | Yes |
| **14** | Argentina | No | No |
| **15** | Chile | Yes | Yes |
| **16** | England | Yes | Yes |
| **17** | Canada | Yes | Yes |
| **18** | Pakistan | No | Yes |
| **19** | Spain | Yes | Yes |
| **20** | Brazil | Yes | Yes |

## 5. HOMOGENEITY

Several batches were prepared by South Quality personnel in an identical way.

Then, a homogeneity study was then carried out with an ISO 17025 accredited laboratory.

Control was carried out according to ISO Guide 35: 2017, clause 7.4.1.2. Stratified random sampling was applied. Samples were selected using random number generation software.

The results of this test appear below:

Size of each batch: **50 samples** Tested samples from each batch: **15 samples**

| DETERMINATION | HOMOGENEITY OF RESULTS IN THE ANALYZED SAMPLES | | |
|---|---|---|---|
| | BATCH: LEM2417 | BATCH: LEM2418 | BATCH: LEM2419 |
| $C_m$ | YES | YES | YES |

Size of each batch: **50 samples** Tested samples from each batch: **15 samples**

| DETERMINATION | HOMOGENEITY OF RESULTS IN THE ANALYZED SAMPLES | | |
|---|---|---|---|
| | BATCH: LEM3224 | BATCH: LEM3225 | BATCH: LEM3226 |
| $C_m$ | NO | YES | YES |

Samples for this program are taken from selected batches identified as LEM2419, and LEM3225.

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.

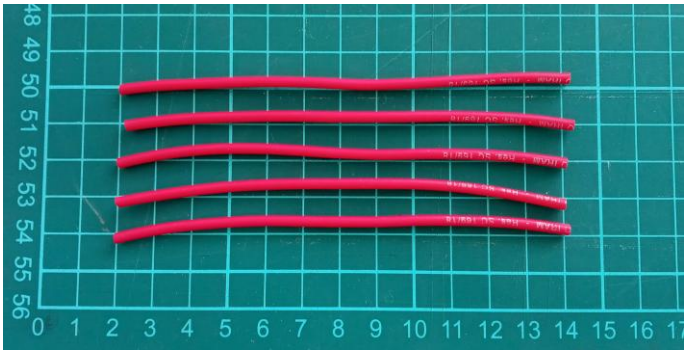
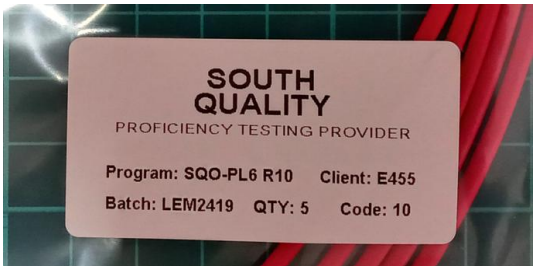
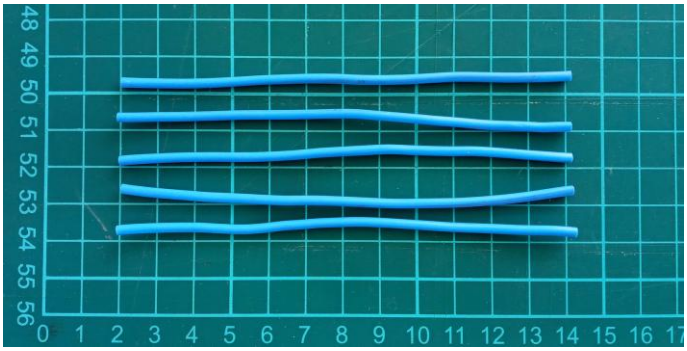
## 6. SAMPLE INFORMATION

The following samples were sent for testing (Participant **Code 19**):

| | |
|---|---|
| Batch: | LEM2419 |
| Sample ID: | 10 |
| Characteristics: | Red single core cable - 1.5 $mm^2$ - Length: 12 cm - 5 units |

| | |
|---|---|
| Batch: | LEM3225 |
| Sample ID: | 04 |
| Characteristics: | Light blue single core cable - 1 $mm^2$ - Length: 12 cm - 5 units |

## 7. IMAGES

| SAMPLES |
| --- |
|         |

## 8. ASSIGNED VALUES

The assigned values are obtained from the results reported by all participants (**Consensus values**).

## 9. PARTICIPANT RESULTS

| LABORATORY CODE | HALOGEN ACID GAS CONTENT - MEAN (%) | |
|---|---|---|
| | BATCH: LEM2419 | BATCH: LEM3225 |
| 01 | 0.339 | 7.025 |
| 03 | 0.353 | 6.469 |
| 04 | 0.347 | 5.915 |
| 05 | 0.260 | 6.316 |
| 06 | 0.404 | 5.873 |
| 07 | 0.575 | 6.327 |
| 09 | 0.405 | 4.879 |
| 10 | 0.653 | 6.304 |
| 11 | 0.520 | 6.445 |
| 12 | 0.648 | 5.006 |
| 13 | 0.656 | 4.189 |
| 15 | 0.180 | 2.578 |
| 16 | 0.462 | 4.495 |
| 17 | 0.445 | 6.417 |
| 18 | 0.655 | 6.420 |
| 19 | 0.490 | 5.230 |
| 20 | 0.000 | 7.285 |

| ASSIGNED VALUES - HALOGEN ACID GAS CONTENT | | | |
|---|---|---|---|
| LEM2419 | | LEM3225 | |
| AVG | SD | AVG | SD |
| 0.435 | 0.182 | 5.716 | 1.186 |

## 10. STATISTICS

The results must be treated as quantitative.

According B.3.1.3 of ISO 17043 the appropriate technique is to compare participant results with the assigned values. The results can be compare 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

| LABORATORY CODE | $\|z$ score$\|$ | |
|---|---|---|
| | BATCH: LEM2419 | BATCH: LEM3225 |
| 01 | 0.53 | 1.10 |
| 03 | 0.45 | 0.63 |
| 04 | 0.48 | 0.17 |
| 05 | 0.96 | 0.51 |
| 06 | 0.17 | 0.13 |
| 07 | 0.77 | 0.52 |
| 09 | 0.16 | 0.71 |
| 10 | 1.20 | 0.5 |
| 11 | 0.47 | 0.61 |
| 12 | 1.17 | 0.60 |
| 13 | 1.21 | 1.29 |
| 15 | 1.40 | 2.65 |
| 16 | 0.15 | 1.03 |
| 17 | 0.05 | 0.59 |
| 18 | 1.21 | 0.59 |
| 19 | 0.30 | 0.41 |
| 20 | 2.39 | 1.32 |

Laboratory **Code 01**: The laboratory obtained **SATISFACTORY** results for both samples.

Laboratory **Code 02**: The laboratory has not sent the results before the deadline.

Laboratory **Code 03**: The laboratory obtained **SATISFACTORY** results for both samples.

Laboratory **Code 04**: The laboratory obtained **SATISFACTORY** results for both samples.

Laboratory **Code 05**: The laboratory obtained **SATISFACTORY** results for both samples.

Laboratory **Code 06**: The laboratory obtained **SATISFACTORY** results for both samples.

Laboratory **Code 07**: The laboratory obtained **SATISFACTORY** results for both samples.

Laboratory **Code 08**: The laboratory has not sent the results before the deadline.

Laboratory **Code 09**: The laboratory obtained **SATISFACTORY** results for both samples.

Laboratory **Code 10**: The laboratory obtained **SATISFACTORY** results for both samples.

Laboratory **Code 11**: The laboratory obtained **SATISFACTORY** results for both samples.

Laboratory **Code 12**: The laboratory obtained **SATISFACTORY** results for both samples.

Laboratory **Code 13**: The laboratory obtained **SATISFACTORY** results for both samples.

Laboratory **Code 14**: The laboratory has not sent the results before the deadline.

Laboratory **Code 15**: The laboratory has obtained a **QUESTIONABLE** result with the LEM3225 samples. Additionally, the laboratory has obtained a **SATISFACTORY** result with the LEM2419 samples.

Laboratory **Code 16**: The laboratory obtained **SATISFACTORY** results for both samples.

Laboratory **Code 17**: The laboratory obtained **SATISFACTORY** results for both samples.

Laboratory **Code 18**: The laboratory obtained **SATISFACTORY** results for both samples.

Laboratory **Code 19**: The laboratory obtained **SATISFACTORY** results for both samples.

Laboratory **Code 20**: The laboratory has obtained a **QUESTIONABLE** result with the LEM2419 samples. Additionally, the laboratory has obtained a **SATISFACTORY** result with the LEM3225 samples.

## GLOBAL PERFORMANCE - SUM OF ABSOLUTE Z SCORE

| POSITION | LABORATORY CODE | z SCORE |
|---|---|---|
| 1st | 06 | 0.30 |
| 2nd | 17 | 0.64 |
| 3rd | 04 | 0.65 |
| 4th | 19 | 0.71 |
| 5th | 09 | 0.87 |
| 6th | 03 | 1.08 |
| 6th | 11 | 1.08 |
| 7th | 16 | 1.18 |
| 8th | 07 | 1.29 |
| 9th | 05 | 1.47 |
| 10th | 01 | 1.63 |
| 11th | 10 | 1.70 |
| 12th | 12 | 1.77 |
| 13th | 18 | 1.80 |
| 14th | 13 | 2.50 |
| 15th | 20 | 3.71 |
| 16th | 15 | 4.05 |

## 12. CONCLUSIONS

The overall performance on this **SQO-PL6 Round 10** program from the participating laboratories, based on expected results, are the following:

- Laboratories Codes **01, 03, 04, 05, 06, 07, 09, 10, 11, 12, 13, 16, 17, 18** and **19** have obtained a **SUFFICIENT** performance according to the expected results and should not take action;

- Laboratories Codes **15,** and **20** have obtained an **ALMOST SUFFICIENT** performance according to the expected results and must evaluate if it is necessary to take corrective action.

- Laboratory Code **--** has obtained an **INSUFFICIENT** performance in accordance with the expected results and must take corrective action (See Appendix B).

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

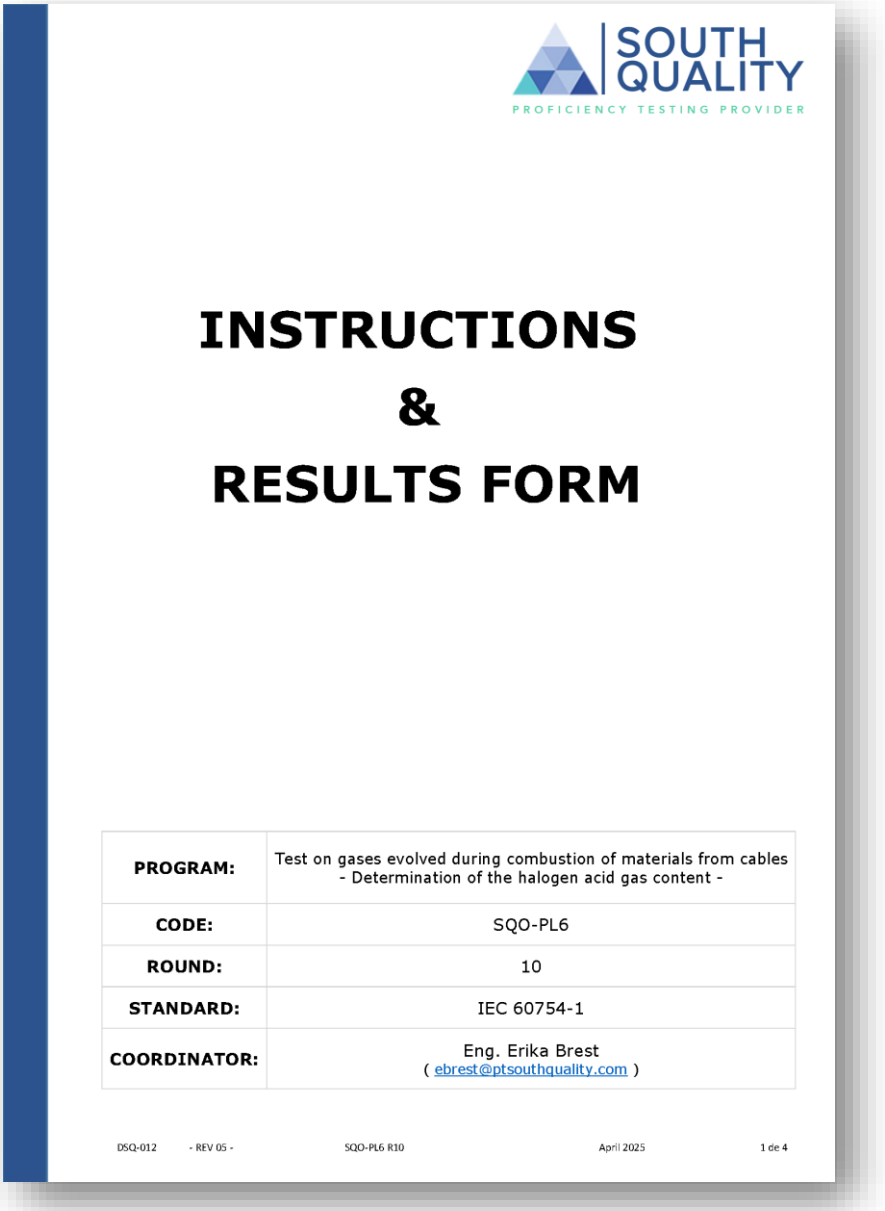
- **SUFFICIENT** performance: No unsatisfactory/questionable results obtained.
- **ALMOST SUFFICIENT** performance: No unsatisfactory results were obtained, but one questionable result was found.
- **INSUFFICIENT** performance: An unsatisfactory result or two questionable results were obtained.

# APPENDIX A

## A1 - PARTICIPANT DATA

| | |
|---|---|
| Company: | **CEIS** |
| Laboratory: | Centro de Ensayos, Innovacion y Servicios SL |
| Country: | Spain |
| Client ID: | E455 |
| Contact person: | Martina Romero Fernández ( Management System Technician ) |
| | mromero@ceis.es |

## A2 - PARTICIPANT RESULTS



SOUTH QUALITY
PROFICIENCY TESTING PROVIDER

**INSTRUCTIONS**
**&**
**RESULTS FORM**

| | |
|---|---|
| **PROGRAM:** | Test on gases evolved during combustion of materials from cables - Determination of the halogen acid gas content - |
| **CODE:** | SQO-PL6 |
| **ROUND:** | 10 |
| **STANDARD:** | IEC 60754-1 |
| **COORDINATOR:** | Eng. Erika Brest ( ebrest@ptsouthquality.com ) |

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## 1 - General

This document is intended to be filled with the results of the **SQO-PL6** program, round 10.

Results must be typed, not handwritten.

## 2 - Standard

**IEC 60754-1: 2011 + AMD 1: 2019**

## 3 - Participant

| | |
|---|---|
| **CEIS**<br>**Centro de Ensayos, Innovacion y Servicios SL** | **CODE 19** |

## 4 - Tests involved

| **TEST** |
|---|
| Determination of the amount of halogen acid gas evolved during the combustion of electric cable ( $C_m$ ) |

## 5 - Samples

| CODE | SAMPLE | QUANTITY |
|---|---|---|
| LEM2419-10 | Red single core cable - 1.5 $mm^2$<br>Length: 12cm | 5 |
| LEM3225-04 | Light blue single core cable - 1 $mm^2$<br>Length: 12cm | 5 |

## 6 - Notes

**a)** The deadline for the delivery of results is **June 13, 2025**.
**b)** The tables in this document may be modified by the participant, if desired, to include data or observations.
**c)** The participant must cut the five received samples and mix them thoroughly. Then, two 750 mg test portions must be prepared according to the instructions in clause 6.1 of the standard.
**d)** To review the results, the submission of images of the tests is appreciated. These images can be attached at the end of this document or sent via email.
**e)** Upon completion of this document, please convert it to a PDF file and send it to the program coordinator.

## 7 - **Test results**

| | |
|---|---|
| Date: | 06/06/2025 |

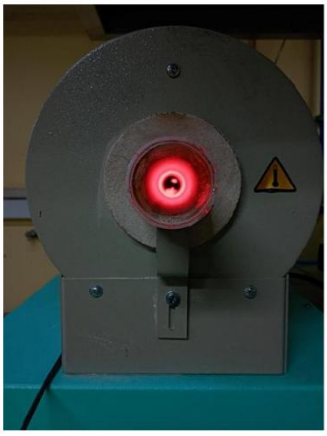
| CONDITIONING | |
|---|---|
| Temperature (°C): | 22 |
| Relative humidity (%): | 45 |
| Time (h): | 24 |

| | |
|---|---|
| Reagent: | • concentrated nitric acid: about 65 %,<br>• nitric acid, approximately 6 M;<br>• 0,1 M silver nitrate;<br>• iso-amyl alcohol;<br>• 40% weight/volume solution of ferric ammonium sulphate;<br>• 0,1 M ammonium thiocyanate solution. |
| Type of test apparatus (Method): | Method 2 |

| LEM2419-10 | |
|---|---|
| SAMPLE | Halogen acid gas content ( % ) |
| I | 0,49 |
| II | 0,49 |
| MEAN | **0,49** |

| LEM3225-04 | |
|---|---|
| SAMPLE | Amount of halogen containing gas ( % ) |
| I | 5,11 |
| II | 5,35 |
| MEAN | **5,23** |

**PHOTOGRAPHS**


# APPENDIX B

# VOID

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