SOUTH QUALITY

PROFICIENCY TESTING PROVIDER

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ISO 6503

PAINTS AND VARNISHES - DETERMINATION OF TOTAL LEAD FLAME ATOMIC ABSORPTION SPECTROMETRIC METHOD

Program: SQO-PT5 (Round 11)

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1. FOREWORD

This report summarizes the results of the **SQO-PT5 (Round 11)** proficiency testing program on the determination of total lead content in paints. This program is carried out under a simultaneous participation format, as described in clause A.2.2 of ISO/IEC 17043: 2023 (Types of PT schemes).

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

2. ORGANIZATION

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

3. OBJECTIVE

The objective of this proficiency testing program is to determine the total lead content in paints in accordance with the following standard:

Standard
ISO 6503: 1984

To perform this verification, paint 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. PARTICIPANTS

In the present round, 24 laboratories have participated with the following details:

CODE	Country	ISO 17025 accredited	Results delivered
01	Colombia	Yes	Yes
02	Germany	Yes	Yes
03	Spain	Yes	Yes
04	Italy	Yes	Yes
05	Brazil	Yes	Yes
06	Portugal	Yes	No
07	Argentina	No	Yes
08	Peru	No	Yes
09	England	Yes	Yes
10	Italy	Yes	Yes
11	Australia	Yes	Yes
12	Portugal	Yes	Yes
13	Canada	Yes	Yes
14	Mexico	Yes	No
15	Germany	Yes	Yes
16	Republic of Korea	Yes	Yes
17	Türkiye	Yes	Yes
18	Belgium	No	Yes
19	France	Yes	Yes
20	South Africa	Yes	Yes
21	Brazil	Yes	No
22	Argentina	No	Yes
23	Hong Kong	Yes	Yes
24	Malaysia	No	Yes

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 the samples were selected using random-number-generation software.

The results of this test are presented below:

Size of each batch: **50 samples** Tested samples from each batch: **10 samples**

DETERMINATION	HOMOGENEITY OF RESULTS IN THE ANALYZED SAMPLES		
	BATCH: LPA3522	BATCH: LPA3523	BATCH: LPA3524
TOTAL LEAD CONTENT	YES	YES	YES

DETERMINATION	HOMOGENEITY OF RESULTS IN THE ANALYZED SAMPLES		
	BATCH: LPA3622	BATCH: LPA3623	BATCH: LPA3624
TOTAL LEAD CONTENT	YES	NO	YES

Samples for this program are taken from the selected batches identified as **LPA3522,** and **LPA3624**.

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.

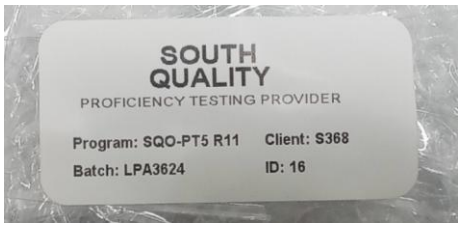
6. SAMPLE INFORMATION

The following samples were sent for testing (Participant **Code 16**):

Batch:	LPA3522
Sample ID:	16.1 + 16.2
Characteristics:	Beige paint - 50 ml (2 units)

Batch:	LPA3624
Sample ID:	16.1 + 16.2
Characteristics:	Black paint - 50 ml (2 units)

7. IMAGES

SAMPLES	
	
	

8. ASSIGNED VALUES

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

Results submitted after the deadline, missing results, and results excluded under the statistical procedure are not included in the consensus.

9. PARTICIPANTS' RESULTS

LABORATORY CODE	TOTAL LEAD CONTENT (mg/kg) - AVG	
	LPA3522	LPA3624
01	318	0.8
02	279	0.7
03	289	0.4
04	287	0.4
05	264	0.5
07	288	0.6
08	254	0.9
09	265	0.6
10	283	0.4
11	280	0.4
12	285	0.6
13	273	0.6
15	285	0.7
16	281	0.5
17	282	0.4
18	263	0.7
19	305	0.3
20	279	0.6
22	288	0.1
23	268	0.4
24	274	0.4

PARAMETER	ASSIGNED VALUES			
	LPA3522		LPA3624	
	MEDIAN	SD	MEDIAN	SD
TOTAL LEAD CONTENT (mg/kg)	282	11.1	0.5	0.15

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´s 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

LABORATORY CODE	| z score |	
	LPA3522	LPA3624
01	3.2 ¤	2.0
02	0.3	1.3
03	0.6	0.7
04	0.5	0.7
05	1.6	0.0
07	0.5	0.7
08	2.5	2.7
09	1.5	0.7
10	0.1	0.7
11	0.2	0.7
12	0.3	0.7
13	0.8	0.7
15	0.3	1.3
16	0.1	0.0
17	0.0	0.7
18	1.7	1.3
19	2.1	1.3
20	0.3	0.7
22	0.5	2.7
23	1.3	0.7
24	0.7	0.7

Laboratory **Code 01**: The laboratory obtained an **UNSATISFACTORY** result for total lead in batch **LPA3522** and a **SATISFACTORY** result in batch **LPA3624**.

Laboratory **Code 02**: The laboratory obtained **SATISFACTORY** results for total lead in both batches.

Laboratory **Code 03**: The laboratory obtained **SATISFACTORY** results for total lead in both batches.

Laboratory **Code 04**: The laboratory obtained **SATISFACTORY** results for total lead in both batches.

Laboratory **Code 05**: The laboratory obtained **SATISFACTORY** results for total lead in both batches.

Laboratory **Code 06**: The laboratory did not send the results before the deadline.

Laboratory **Code 07**: The laboratory obtained **SATISFACTORY** results for total lead in both batches.

Laboratory **Code 08**: The laboratory obtained **QUESTIONABLE** results for total lead in both batches.

Laboratory **Code 09**: The laboratory obtained **SATISFACTORY** results for total lead in both batches.

Laboratory **Code 10**: The laboratory obtained **SATISFACTORY** results for total lead in both batches.

Laboratory **Code 11**: The laboratory obtained **SATISFACTORY** results for total lead in both batches.

Laboratory **Code 12**: The laboratory obtained **SATISFACTORY** results for total lead in both batches.

Laboratory **Code 13**: The laboratory obtained **SATISFACTORY** results for total lead in both batches.

Laboratory **Code 14**: The laboratory did not send the results before the deadline.

Laboratory **Code 15**: The laboratory obtained **SATISFACTORY** results for total lead in both batches.

Laboratory **Code 16**: The laboratory obtained **SATISFACTORY** results for total lead in both batches.

Laboratory **Code 17**: The laboratory obtained **SATISFACTORY** results for total lead in both batches.

Laboratory **Code 18**: The laboratory obtained **SATISFACTORY** results for total lead in both batches.

Laboratory **Code 19**: The laboratory obtained a **QUESTIONABLE** result for total lead in batch **LPA3522** and a **SATISFACTORY** result in batch **LPA3624**.

Laboratory **Code 20**: The laboratory obtained **SATISFACTORY** results for total lead in both batches.

Laboratory **Code 21**: The laboratory did not send the results before the deadline.

Laboratory **Code 22**: The laboratory obtained a **QUESTIONABLE** result for total lead in batch **LPA3624** and a **SATISFACTORY** result in batch **LPA3522**.

Laboratory **Code 23**: The laboratory obtained **SATISFACTORY** results for total lead in both batches.

Laboratory **Code 24**: The laboratory obtained **SATISFACTORY** results for total lead in both batches.

GLOBAL PERFORMANCE - SUM OF ABSOLUTE Z SCORE

POSITION	LABORATORY CODE	z SCORE
1st	16	0.1
2nd	17	0.7
3rd	10	0.8
4th	11	0.9
5th	12	1.0
5th	20	1.0
6th	04	1.2
6th	07	1.2
7th	03	1.3
8th	24	1.4
9th	13	1.5
10th	02	1.6
10th	05	1.6
10th	15	1.6
12th	23	2.0
13th	09	2.2
14th	18	3.0
15th	22	3.2
16th	19	3.4
17th	01	5.2
17th	08	5.2

12. CONCLUSIONS

The overall performance in the **SQO-PT5 (Round 11)** program, based on expected results from the participating laboratories, was as follows:

- Participant Codes **02, 03, 04, 05, 07, 09, 10, 11, 12, 13, 15, 16, 17, 18, 20, 23** and **24** have obtained **SUFFICIENT** performance according to the expected results, and no action is required;

- Participant Code **19** and **22** has obtained an **ALMOST SUFFICIENT** performance according to the expected results and must evaluate if it is necessary to take corrective action;

- Participant Code **01 and 08** have obtained an **INSUFFICIENT** performance according to the expected results and must take corrective action (See Appendix B).

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

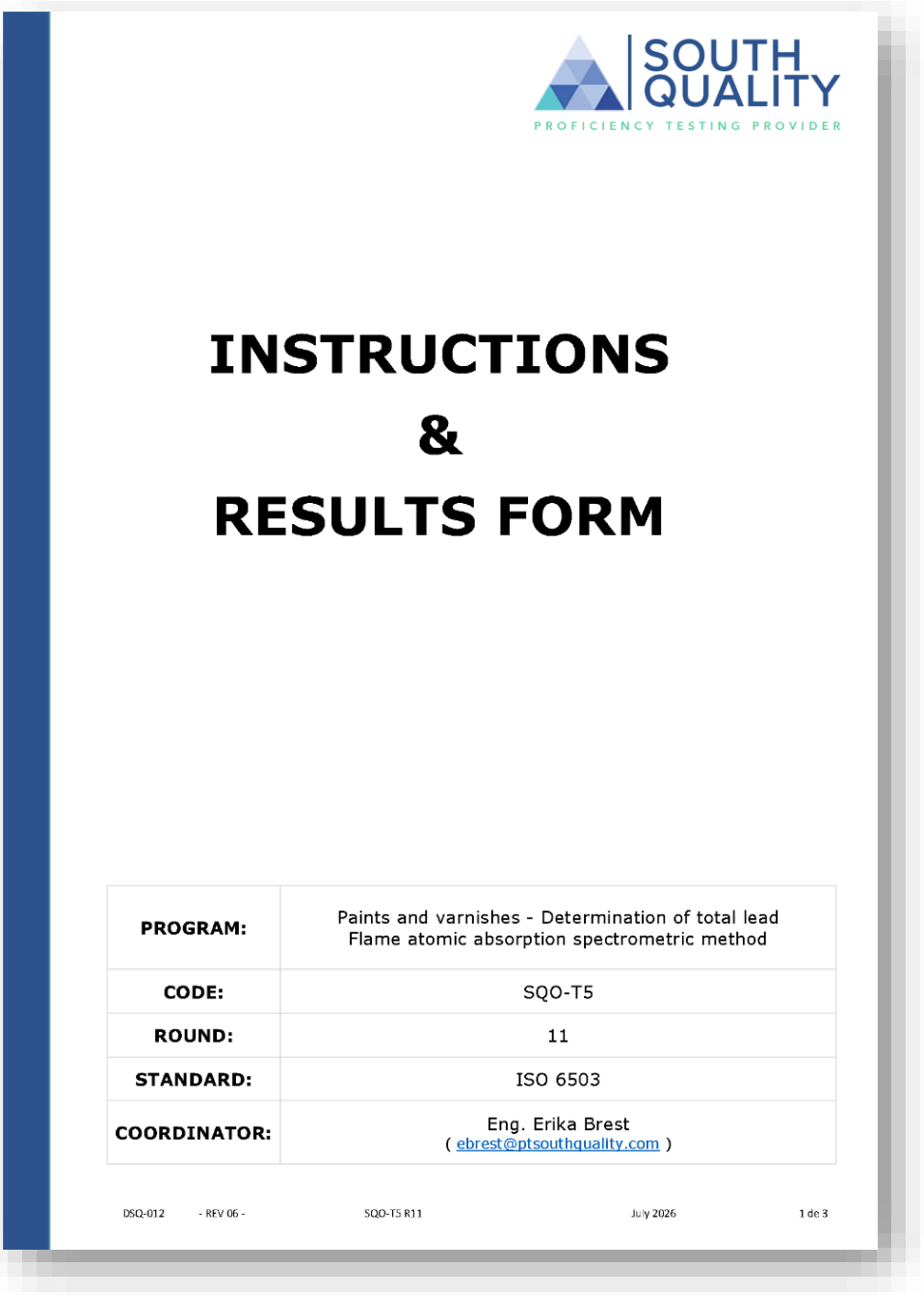
- **SUFFICIENT** performance: No unsatisfactory/questionable results obtained.
- **ALMOST SUFFICIENT** performance: No unsatisfactory results were obtained, but one questionable result was found.
- **INSUFFICIENT** performance: An unsatisfactory result or two questionable results were obtained.

APPENDIX A

A1 - PARTICIPANT DATA

Company:	**KCC Corporation Central Research Institute**
Country:	Republic of Korea
Client ID:	S368
Contact person:	Wan Dong Kim - CRI. Analytics Team
	wdkim7861@kccworld.co.kr

A2 - INSTRUCTIONS



INSTRUCTIONS
&
RESULTS FORM

PROGRAM:	Paints and varnishes - Determination of total lead Flame atomic absorption spectrometric method
CODE:	SQO-T5
ROUND:	11
STANDARD:	ISO 6503
COORDINATOR:	Eng. Erika Brest (ebrest@ptsouthquality.com)

DSQ-012 - REV 06 - SQO-T5 R11 July 2026 1 de 3

1 - **General**

This document serves as a guide for managing the results of the **SQO-T5 (Round 11)** program.

2 - **Standard**

ISO 6503: 1984

3 - **Participant**

KCC Corporation KCC Corporation Central Research Institute	**CODE 16**

4 - **Tests involved**

TEST
Determination of total lead in paints - Lead content [% (m/m)] (Dry ashing method)

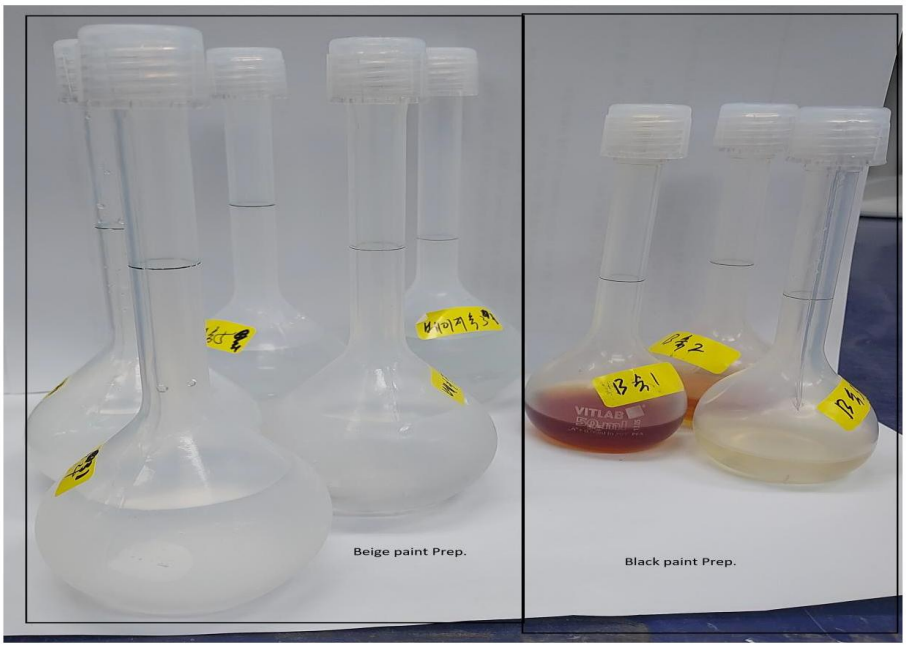
5 - **Samples**

CODE	CHARACTERISTICS	QUANTITY
LPA3522-16	Beige paint - 50 ml	2
LPA3624-16	Black paint - 50 ml	2

6 - **Notes**

a) The deadline for the delivery of results is **September 11, 2026**.
b) The participant must submit the results using the usual report employed by their laboratory.
c) The samples are to be handled as routine lab samples, with all testing, documentation, and reporting adhering to **ISO 6503**.
d) The determination shall be performed in duplicate. Two specimens are provided for each sample for this purpose.
e) The samples must be kept until the end of the program, which concludes with the submission of the final report.
f) To review the results, test images would be appreciated. Images can be attached at the end of this document or sent by email.

PHOTOGRAPHS



A3 - PARTICIPANT RESULTS (TEST REPORT #LPA3522)

REPORT

Date 2026. 8 .31.

SUBJECT TITLE	Proficiency Test / SQO-T5 / LPA3522-16			
REFERENCE	ISO 6503:1984	Ambient condition	Laboratory	Element Lab.
			Device	S/N 85237019
			Value	26.3 °C / 65.2% R.H.
Request number		Tested by	wan dong kim 김완동	Reviewed by 이정원 Yang

<Traceability>

Equipment Name	Model name	Calibration method		
		Item	CRM	Expiry date
AAS	Analytik Jena contrAA 700	Pb	AccuStandard Lead ICP Standard, 1 000 mg/L Lot. 222065210	2027.07.08.
Electronic Balance	SARTORIUS MSA225P-100-DA	Cal. Cert. No. : SC2603-08467-2 Cal. Date : 2026.03.17.		

<Raw data>

1. Calibration Line

1). Pb Standard Preparation Date : 2026.09.01.

(Unit : mg/L)	1 point	2 point	3 point	4 point	5 point
Pb	0	0.5	1	2	3

2. Sample Preparation Details

Organics	Dry	480 °C, 1 hr	Grinding		Beaker Type	Glass	Dilution	0.4g / 100mL
	Wet							
Acid digestion	HCl					Etc.		

(1/3)

KCC-NQP-15-F01(01) KCC Coporation Central Research Institute A4(210x297)

<Raw data>

3. Sample Weight

No.	Sample Name	Sample Weight (Unit : g)	Recovered Vol. (Unit : mL)	Etc.
1	Beige paint #1	0.5058	100	
2	Beige paint #2	0.4160	100	
3	Beige Paint #3	0.5749	100	
4	Beige Paint #4	0.4517	100	
5	Beige Paint #5	0.4374	100	

(213)

KCC-NQP-15-F01(01) KCC Coporation Central Research Institute A4(210x297)

<Raw data>

4. Result

1) Pb

(1) AAS Measurement data

Sample Name (Unit : mg/L)	Beige Paint #1	Beige Paint #2	Beige Paint #3	Beige Paint #4	Beige Paint #5
Pb	1.431	1.115	1.568	1.319	1.195

(2) Result

Sample Name (Unit : mg/kg)	Beige Paint #1	Beige Paint #2	Beige Paint #3	Beige Paint #4	Beige Paint #5
Pb	283	282	273	292	273

-. Beige Paint (Average)

Pb : 281 mg/kg

+ Calculation Formula

$\frac{C \times V}{S}$, C : Measured concentration (mg/L) / V : Recovered Volume (mL)

S : Sample Weight (g)

(3/3)

KCC-NQP-15-F01(01) KCC Coporation Central Research Institute A4(210x297)

A4 - PARTICIPANT RESULTS (TEST REPORT #LPA3624)

REPORT

Date 2026. 8. 24

SUBJECT TITLE	Proficiency Test / SQO-T5 / LPA3624-16			
REFERENCE	ISO 6503:1984	Ambient condition	Laboratory	Element Lab.
			Device	S/N 85237019
			Value	25.7 ℃ 164.1 % R.H.
Request number		Tested by	Wan doug Kim 김완중	Reviewed by 양경원

<Traceability>

Equipment Name	Model name	Calibration method		
		Item	CRM	Expiry date
AAS	Analytik Jena contrAA 700	Pb	AccuStandard Lead ICP Standard, 1 000 mg/L Lot. 222065210	2027.07.08.
Electronic Balance	SARTORIUS MSA225P-100-DA	Cal. Cert. No. : SC2603-08467-2 Cal. Date : 2026.03.17.		

<Raw data>

1. Calibration Line

1). Pb Standard Preparation Date : 2026.08.27.

(Unit : mg/L)	1 point	2 point	3 point	4 point	5 point
Pb	0	0.1	0.2	0.5	1

2. Sample Preparation Details

Organics	Dry	480 ℃, 1 hr	Grinding		Beaker Type	Glass	Dilution	20g / 50mL
	Wet							
Acid digestion	HCl					Etc.		

(1/3)

KCC-NQP-15-F01(01) KCC Coporation Central Research Institute A4(210x297)

<Raw data>

3. Sample Weight

No.	Sample Name	Sample Weight (Unit : g)	Recovered Vol. (Unit : mL)	Etc.
1	Black paint #1	20.1940	50	
2	Black paint #2	20.0557	50	
3	Black paint #3	20.5101	50	

(2/3)

KCC-NQP-15-F01(01) KCC Coporation Central Research Institute A4(210x297)

<Raw data>

4. Result

1) Pb

(1) AAS Measurement data

Sample Name (Unit : mg/L)	Black paint #1	Black paint #2	Black paint #3
Pb	0.2081	0.2055	0.2258

(2) Result

Sample Name (Unit : mg/kg)	Black paint #1	Black paint #2	Black paint #3
Pb	0.5	0.5	0.6

-. Black paint (Average)

Pb : 0.5 mg/kg

+ Calculation Formula

$\frac{C \times V}{S}$, C : Measured concentration (mg/L) / V : Recovered Volume (mL)

S : Sample Weight (g)

(3/3)

KCC-NQP-15-F01(01) KCC Coporation Central Research Institute A4(210x297)

APPENDIX B

VOID

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