



Professional Calibration & Services Co., Ltd.

50/888, 50/889 Moo 2, Rungsit-Nakornnayok Rd., Bungeeetho, Thunyaburi,
Pathumthani 12130 Thailand
Tel : (+66)2150-6641 (Autoline), (+66)2569-5158
Email : info@p-cal.com www.p-cal.com



Certificate of Calibration

Certificate Number : EL18510/24

Page 1 of 3

Control Number : PCAL164484

Customer Control : CE-LIG-003

Description : Liquid In Glass Thermometer

Manufacturer : Precision

Model : DIN 12775

Serial Number : 60831

Customer : C E LAB & CONSULTING CO., LTD.

245 M. 4, T. NONGSAI, A. DANKHUNTHOT,
NAKHONRATCHASIMA ,THAILAND 36220

Date of Receipt : 18-Apr-24

Date of Calibration : 19-Apr-24

Environment : Temperature $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$
: Relative Humidity $50\% \pm 20\%$

Calibration Method : Calibration Procedure Number CP-EL15

Calibration Results : See data attached

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

This certificate is issued in accordance with ISO/IEC17025 and the conditions of accreditation granted by the Accreditation Body which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. The results relate only to the item calibrated.

This certificate shall not be reproduced other than in full except without the prior written approval of the Head of Calibration Laboratory of Professional Calibration & Services Co., Ltd.

Calibrated By

Mr. Worachote Krataychan

Authorized Signature

(Mr. Jumnong Jumphong)

24-Apr-24

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : EL18510/24

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Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Multimeter	US36044660	ANAB : AC-2590	EL54104/23	10-Dec-24
Platinum Resistance Thermometer	1036223	ANAB : AC-2590	EL23646/23	18-Jun-24
Micro Bath	A62634	ANAB : AC-2590	EL12309/24	15-Mar-25

Condition as received : Normal

Definitions :-

* ANAB - The ANSI National Accreditation Board

CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No.: EL18510/24

Page : 3 of 3

Calibration Results

Temperature Calibration

UUC Indicated	Standard Value	UUC Error	Uncertainty (\pm)
104 °C	104.05 °C	-0.05 °C	0.15 °C
110 °C	110.05 °C	-0.05 °C	0.15 °C
140 °C	140.08 °C	-0.08 °C	0.15 °C
145 °C	145.10 °C	-0.10 °C	0.15 °C
180 °C	180.10 °C	-0.10 °C	0.15 °C

...End...



Certificate of Calibration

Certificate No.: WK2403-304-005

Page 1 of 2

Customer : C E LAB & CONSULTING CO.,LTD
245 M. 4 T. NONGSAI A. DANKHUNTHOT
NAKHON RATCHASIMA, THAILAND 36220

Instrument : Electronic Balance
Manufacturer : Sartorius
Model : PRACTUM224-1S
Serial No. : 0035006938
Identity No. : CE-BAL-004
Range : 0 g to 200 g
Resolution : 0.0001 g
Calibration Method : CP-WK-M01

Ambient Temperature : $(25 \pm 3) ^\circ\text{C}$
Humidity : $(50 \pm 15) \% \text{RH}$
Received Date : 7-Mar-24
Calibrated Date : 7-Mar-24
Issued Date : 8-Mar-24
Calibrated Location : In Lab

Standard Instrument

<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Standard Weights Set	WK-CB-014	M2401094S	16-Jan-26	TCS

TCS : THAI CALIBRATION SERVICES CO., LTD.

This result calibrate was found accurate as shown on date place of calibrate only

This certificate is traceability to the International System of Unit (SI)

The reported expanded uncertainty it was multiplied by a coverage factor $k = 2$ providing a level of confidence approximately 95 %

Calibrated by : Mr. Tanawat Kaidao

Approved by :

Mr. Ratchadawut Rungravee

Authorized Signatory

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Calibration Results

Certificate No. : WK2403-304-005

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Calibration Result of the Accuracy

Determine of the standard deviation of weighing machine (n = 10)

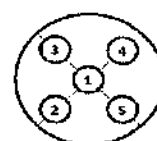
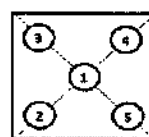
Nominal Value	Standard Deviation
g	g
200	0.00004

Effect of off center loading

A mass of 50 g was placed to various on the pan. The Weighing Machine reading error obtained is given in the table.

Unit : g

1	2	3	4	5	Max Difference
0.0002	0.0002	0.0001	0.0003	0.0002	0.0002



Departure from Norminal Value

Scale Range : 0 g to 200 g

Resolution : 0.0001 g

Unit : g

Standard Value	UUC Reading	Error	Uncertainty (± g)
0.0000	0.0000	0.0000	0.00014
0.0500	0.0502	0.0002	0.00014
0.1000	0.1002	0.0002	0.00014
1.0000	1.0002	0.0002	0.00014
2.0000	2.0003	0.0003	0.00014
5.0000	5.0004	0.0004	0.00014
10.0000	10.0003	0.0003	0.00014
20.0000	20.0003	0.0003	0.00014
50.0000	50.0002	0.0002	0.00014
100.0000	100.0003	0.0003	0.00014
200.0000	200.0004	0.0004	0.00028

Result of Calibration : No Adjustment

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**** End of Certificate****



Certificate of Calibration

Certificate No. : WK2403-304-007

Page 1 of 2

Customer : C E LAB & CONSULTING CO.,LTD
245 M. 4 T. NONGSAI A. DANKHUNTHOT
NAKHON RATCHASIMA, THAILAND 36220

Instrument	: Water Bath	Ambient Temperature	: (25 ± 2) °C
Manufacturer	: Memmert	Humidity	: (50 ± 15) %RH
Model	: WNB29	Received Date	: 7-Mar-24
Serial No.	: L616.0204	Calibrated Date	: 7-Mar-24
Identity No.	: CE-WAT-001	Issued Date	: 8-Mar-24
Range	: 95 °C	Calibrated Location	: Laboratory 1
Resolution	: 0.1 °C		
Calibration Method	: CP-WK-T15		

Reference standard instruments :

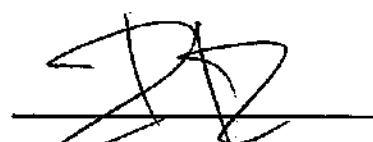
<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Data Acquisition / Switch Unit	US37029031	WK2308-302-224	28-Aug-24	WK Electric Co., Ltd.

This result calibrate was found accurate as shown on date place of calibrate only
This certificate is traceability to the International System of Unit (SI)

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence approximately 95 %

Calibrated by : Mr. Pongpat Prasong

Approved by :


Mr. Patchadawut Rungravee
Authorized Signatory

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Calibration Results

Certificate No. : WK2403-304-007

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Calibration Result of the Accuracy

Range : 95 °C

Resolution : 0.1 °C

Temperature Calibration

Unit : °C

Calibration Point	Measured Temperature (°C) @ Thermocouple No. (Thermocouple No. 9 is REF.)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9	
95	95.635	95.597	95.907	95.448	95.836	95.831	95.408	95.995	95.652	0.17

Unit : °C

UUC Setting	Standard Reading	Temperature Stability (±)	Temperature Uniformity	Overall Variation
95.0	95.70	0.42	0.75	1.38

Uniformity : The maximum difference of measured temperature/humidity at any sensors and measured temperature. at the reference location which are observed at the same time or at close observation time as possible to determine the temperature. pattern or homogeneity within the chamber at steady-state conditions.

Stability : The one - half of greatest maximum difference of measured temperature at any one sensor, for at least half an hour after reaching steady state or after one achieved complete cycle of control whichever comes first.

Overall Variation : the difference of the maximum and the minimum measured temperature/humidity throughout observation time.

Record time : Start time record after temperature stable. **Average*** : The average of 30 values.

Uncertainty : The report uncertainty of measurement were excluded uniformity and stability.

UUC = Unit Under Calibrate

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**** End of Certificate****



Certificate of Calibration

Certificate No.: WK2403-304-002

Page 1 of 3

Customer : C E LAB & CONSULTING CO.,LTD
245 M. 4 T. NONGSAI A. DANKHUNTHOT
NAKHON RATCHASIMA, THAILAND 36220

Instrument	: Moisture Analyzer	Ambient Temperature	: (23 ± 3) °C
Manufacturer	: AND	Humidity	: (50 ± 15) %RH
Model	: MX-50	Received Date	: 7-Mar-24
Serial No.	: P1048836	Calibrated Date	: 7-Mar-24
Identity No.	: CE-MOI-001	Issued Date	: 8-Mar-24
Range	: See to data	Calibrated Location	: In Lab
Resolution	: See to data		
Calibration Method	: CP-WK-M01, CP-WK-T09		

Standard Instrument

<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Standard Weights Set	WK-CB-014	M2401094S	16-Jan-26	TCS
Data Acquisition / Switch Unit	US37029031	WK2308-302-224	28-Aug-24	WK Electric Co., Ltd.

TCS : THAI CALIBRATION SERVICES CO., LTD.

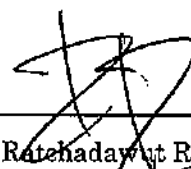
This result calibrate was found accurate as shown on date place of calibrate only

This certificate is traceability to the International System of Unit (SI)

The reported expanded uncertainty it was multipiled by a coverage factor $k = 2$ providing a level of confidence approximately 95 %

Calibrated by : Mr. Kritsada Oupparattha

Approved by :


Mr. Ratchadawut Rungravee
Authorized Signatory

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Calibration Results

Certificate No. : WK2403-304-002

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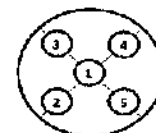
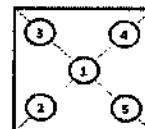
Calibration Result of the Accuracy**Function : Weight Measurement**Determinate of the standard deviation of weighing machine (n = 10)

Nominal Value	Standard Deviation
g	g
50	0.0000

Effect of off center loading

A mass of 20 g was placed to various on the pan. The Weighing Machine reading error obtained is given in the table.

Unit : g					
1	2	3	4	5	Max Difference
0.000	0.000	0.000	0.000	0.000	0.000

Departure from Norminal Value

Scale Range : 0 g to 50 g

Resolution : 0.001 g

Unit : g			
Standard Value	UUC Reading	Error	Uncertainty (± g)
0	0.000	0.000	0.00058
1	1.000	0.000	0.00058
5	5.000	0.000	0.00058
10	10.000	0.000	0.00058
20	20.000	0.000	0.00058
30	30.000	0.000	0.00058
40	40.000	0.000	0.00058
50	50.000	0.000	0.00058

Result of Calibration : No Adjustment

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Calibration Results

Certificate No. : WK2403-304-002

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Calibration Result of the Accuracy

Function : Temperature Measurement
Range : 100 °C to 160 °C
Resolution : 1°C

Unit: °C

UUC Setting	Standard Reading	Error	Uncertainty (± °C)
100	101.87	-1.87	0.58
160	160.32	-0.32	0.58

Result of Calibration : No Adjustment

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**** End of Certificate****



Certificate of Calibration

Certificate No. : WK2402-300-627

Page: 1 of 4

Customer : C E LAB & CONSULTING CO.,LTD.
245 M.4, T.Nongsai, A.Dankhunthot,
Nakhonratchasima 36220 Thailand.

Instrument	: Water Quality Meter	Ambient Temperature	: (23.0 ± 2) °C
Manufacturer	: N/A	Humidity	: (50.0 ± 15) %RH
Model	: EZ-9909SP	Received Date	: 13-Feb-24
Serial No.	: N/A	Calibrated Date	: 17-Feb-24
Identity No.	: CE-WQT-001	Issued Date	: 17-Feb-24
Range	: See to data	Calibrated Location	: In Lab
Resolution	: See to data		
Calibration Method	: CP-WK-C04,CP-WK-C09,CP-WK-T09,CP-WK-C01,CP-WK-C06		

Reference Standard Instrument :

<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Conductivity Buffer STD	HI7033L	7605	1-Apr-25	NIST
Conductivity Buffer STD	HI7031L	7675	30-Apr-27	NIST
Conductivity Buffer STD	HI7039L	7493	2-Feb-27	NIST
Conductivity Buffer STD	HI7030L	7768	5-May-27	NIST
Standard Salinity Solution	794103	97649762	2-Oct-24	CPAchem
Standard Salinity Solution	794104	97649885	2-Oct-24	CPAchem
Digital Thermometer	WK-CT-025	WK2202-139-8	25-Feb-23	WK Electric Co.,Ltd.
TDS (as NaCl) 100 mg/l	794092	61234505	27-Feb-24	CPAchem
TDS (as NaCl) 1000 mg/l	794094	61234253	27-Feb-24	CPAchem
TDS (as NaCl) 1500 mg/l	794095	61234734	27-Feb-24	CPAchem
pH Solution	880819	61270213	13-Mar-25	CPAchem
pH Solution	880818	61267169	13-Mar-24	CPAchem
pH Solution	880822	61260481	13-Mar-24	CPAchem

NIST : National Institute of Standard and Technology.

This result calibrate was found accurate as shown on date place of calibrate only

This certificate is traceability to the International System of Unit (SI).

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence approximately 95 %

Calibrated by : Ms. Usa Phuangphiphat

Approved by :

Mr. Ratchadawut Rungravee

Authorized Signatory

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Calibration Results

Certificate No.: WK2402-300-627

Page: 2 of 4

Calibration Result of the Accuracy

Function : Conductivity Measurement at 25 °C

Resolution : 1 uS/cm, 0.01 mS/cm

(Unit : $\mu\text{S/cm}$)

STD Solution	UUC Reading	Error	Uncertainty (\pm)
84 $\mu\text{S/cm}$	84 $\mu\text{S/cm}$	0 $\mu\text{S/cm}$	0.69 $\mu\text{S/cm}$
1413 $\mu\text{S/cm}$	1410 $\mu\text{S/cm}$	-3 $\mu\text{S/cm}$	11 $\mu\text{S/cm}$
5000 $\mu\text{S/cm}$	5000 $\mu\text{S/cm}$	0 $\mu\text{S/cm}$	39 $\mu\text{S/cm}$
12.88 mS/cm	12.86 mS/cm	-0.02 mS/cm	0.098 mS/cm

Function : Salt Measurement at 20 °C

Resolution : 0.01 % Salt

(Unit : % Salt)

STD Solution	Test Temp.	UUC Reading	Error	Uncertainty (\pm %Salt)
0.30	20.0	0.32	0.02	0.0012
3.00	20.0	3.03	0.03	0.0012

(X) Without Adjustment () After Adjustment

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Calibration Results

Certificate No. : WK2402-300-627

Page 3 of 4

Calibration Result of the Accuracy

Function : TDS Measurement at 25 °C

Resolution : 1 ppm

Unit : ppm

STD Solution	UUC Reading	Error	Uncertainty (± ppm)
100	99	-1	0.50
1000	998	-2	3.6
1500	1495	-5	6.0

Function : pH Measurement at 25 °C

Range : 4 pH to 10 pH

Resolution : 0.01 pH

Unit : pH

STD Solution	UUC Reading	Error	Uncertainty (± pH)
4.01	3.99	-0.02	0.061
7.01	7.00	-0.01	0.061
10.01	10.00	-0.01	0.065

(X) Without Adjustment () After Adjustment

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Calibration Results

Certificate No. : WK2402-300-627

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Calibration Result of the Accuracy

Function : Temperature Measurement

Resolution : 0.1 °C

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (± °C)
20	20.02	19.9	-0.12	0.18
25	25.01	24.9	-0.11	0.18
30	30.00	29.9	-0.10	0.18
35	35.02	34.8	-0.22	0.18

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**** End of Certificate****



Certificate of Calibration

Certificate No. : WK2401-304-72

Page: 1 of 2

Customer : CE LAB & CONSULTING CO.,LTD
245 M.4 T. NONGSAI A. DANKHUNTHOT
NAKHONRATCHASIMA, THAILAND 36220

Instrument	: Liquid in Glass Thermometer	Ambient Temperature	: (25.0 ± 2) °C
Manufacturer	: Precision	Humidity	: (50.0 ± 15) %RH
Model	: DIN 12775	Received Date	: 23-Jan-24
Serial No.	: 51046	Calibrated Date	: 23-Jan-24
Identity No.	: CE-LIG-001	Issued Date	: 23-Jan-24
Range	: 0 °C to 20 °C	Calibrated Location	: In-Lab
Resolution	: 0.5 °C		
Calibration Method	: CP-WK-T13		

Reference Standard Instrument

<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Temperature Indicator with PRT Standards	895	PSL-T 0540/66	13-Mar-24	TISTR

TISTR : Thailand Institute of Scientific and Technological Research

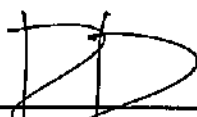
This result calibrate was found accurate as shown on date place of calibrate only

This certificate is traceability to the International System of Unit (SI)

The reported expanded uncertainty it was multiplied by a coverage factor $k = 2$ providing a level of confidence approximately 95 %

Calibrated by : Ms. Usa Phuangphiphat

Approved by :


Mr. Ratchadawut Rungravee

Authorized Signatory

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Calibration Results

Certificate No.: WK2401-304-72

Page: 2 of 2

Calibration Result of the Accuracy

Function : Temperature Measurement

Range : 0 °C to 20 °C

Resolution : 0.5 °C

Temperature Setting (°C)	UUC Reading (°C)	Standard Reading (°C)	UUC Error (°C)	Uncertainty (°C)
0	0.0	0.01	-0.01	0.29
3	3.0	3.02	-0.02	0.29
20	20.0	20.01	-0.01	0.29

(X) Without Adjustment () After Adjustment

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**** End of Certificate****



Certificate of Calibration

Certificate No. : WK2401-304-73

Page: 1 of 2

Customer : CE LAB & CONSULTING CO.,LTD
245 M.4 T. NONGSAI A. DANKHUNTHOT
NAKHONRATCHASIMA, THAILAND 36220

Instrument	: Liquid in Glass Thermometer	Ambient Temperature	: (25.0 ± 2) °C
Manufacturer	: Precision	Humidity	: (50.0 ± 15) %RH
Model	: DIN 12775	Received Date	: 23-Jan-24
Serial No.	: 51063	Calibrated Date	: 23-Jan-24
Identity No.	: CE-LIG-002	Issued Date	: 23-Jan-24
Range	: 0 °C to 20 °C	Calibrated Location	: In-Lab
Resolution	: 0.5 °C		
Calibration Method	: CP-WK-T13		

Reference Standard Instrument

<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Temperature Indicator with PRT Standards	895	PSL-T 0540/66	13-Mar-24	TISTR

TISTR : Thailand Institute of Scientific and Technological Research

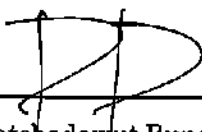
This result calibrate was found accurate as shown on date place of calibrate only

This certificate is traceability to the International System of Unit (SI)

The reported expanded uncertainty it was multiplied by a coverage factor $k = 2$ providing a level of confidence approximately 95 %

Calibrated by : Ms. Usa Phuangphiphat

Approved by :


Mr. Ratchadawut Rungravee
Authorized Signatory

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Calibration Results

Certificate No.: WK2401-804-73

Page: 2 of 2

Calibration Result of the Accuracy

Function : Temperature Measurement

Range : 0 °C to 20 °C

Resolution : 0.5 °C

Temperature Setting (°C)	UUC Reading (°C)	Standard Reading (°C)	UUC Error (°C)	Uncertainty (°C)
0	0.0	0.02	-0.02	0.29
3	3.0	3.03	-0.03	0.29
20	20.0	20.03	-0.03	0.29

(X) Without Adjustment () After Adjustment

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**** End of Certificate****



Certificate of Calibration

Certificate No.: WK2403-304-003

Page 1 of 2

Customer : C E LAB & CONSULTING CO.,LTD
245 M. 4 T. NONGSAI A. DANKHUNTHOT
NAKHON RATCHASIMA, THAILAND 36220

Instrument : Electronic Balance
Manufacturer : Sartorius
Model : PRACTUM224-1S
Serial No. : 0037309195
Identity No. : CE-BAL-002
Range : 0 g to 200 g
Resolution : 0.0001 g
Calibration Method : CP-WK-M01

Ambient Temperature : $(25 \pm 3) ^\circ\text{C}$
Humidity : $(50 \pm 15) \% \text{RH}$
Received Date : 7-Mar-24
Calibrated Date : 7-Mar-24
Issued Date : 8-Mar-24
Calibrated Location : In Lab

Standard Instrument

<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Standard Weights Set	WK-CB-014	M2401094S	16-Jan-26	TCS

TCS : THAI CALIBRATION SERVICES CO., LTD.


This result calibrate was found accurate as shown on date place of calibrate only

This certificate is traceability to the International System of Unit (SI)

The reported expanded uncertainty it was multipiled by a coverage factor $k = 2$ providing a level of confidence approximately 95 %

Calibrated by : Mr. Tanawat Kaidao

Approved by :


Mr. Ratchadawut Rungravee
Authorized Signatory

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Calibration Results

Certificate No. : WK2403-304-003

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Calibration Result of the Accuracy

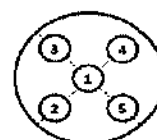
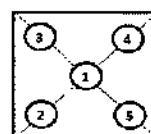
Determinate of the standard deviation of weighing machine (n = 10)

Nominal Value g	Standard Deviation g
200	0.00004

Effect of off center loading

A mass of 50 g was placed to various on the pan. The Weighing Machine reading error obtained is given in the table.

Unit : g					
1	2	3	4	5	Max Difference
-0.0016	-0.0022	0.0015	0.0023	0.0003	0.0045



Departure from Normal Value

Scale Range : 0 g to 200 g

Resolution : 0.0001 g

Unit : g			
Standard Value	UUC Reading	Error	Uncertainty (± g)
0.0000	0.0000	0.0000	0.00014
0.0500	0.0502	0.0002	0.00014
0.1000	0.1001	0.0001	0.00014
1.0000	1.0001	0.0001	0.00014
2.0000	2.0002	0.0002	0.00014
5.0000	5.0001	0.0001	0.00014
10.0000	10.0002	0.0002	0.00014
20.0000	20.0002	0.0002	0.00014
50.0000	50.0003	0.0003	0.00014
100.0000	100.0004	0.0004	0.00014
200.0000	200.0004	0.0004	0.00028

Result of Calibration : No Adjustment

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**** End of Certificate****



Certificate of Calibration

Certificate No.: WK2404-300-80

Page 1 of 2

Customer : C E LAB & CONSULTING CO.,LTD.
245 M.4, T.Nongsai, A.Dankhunhot,
Nakhonratchasima 36220 Thailand.

Instrument	: Conductivity Meter	Ambient Temperature	: (35.0 ± 5) °C
Manufacturer	: OHAUS	Humidity	: (50.0 ± 15) %RH
Model	: ST3100C	Received Date	: 4-Apr-24
Serial No.	: B529184171	Calibrated Date	: 4-Apr-24
Identity No.	: CE-CON-001	Issued Date	: 4-Apr-24
Range	: See to data	Calibrated Location	: Laboratories 1
Resolution	: See to data		
Calibration Method	: CP-WK-C04		

Reference standard instruments :

<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Conductivity Solution STD	HI7033L	8432	30-Dec-25	NIST
Conductivity Solution STD	HI7031L	8175	30-Sep-27	NIST
Conductivity Solution STD	HI7039L	7493	20-Feb-27	NIST
Conductivity Solution STD	HI7030L	7768	30-May-27	NIST
Secondary Standard PRT	4507	PSL-T 0401/67	21-Feb-26	TISTR

NIST : National Institute of Standard and Technology.

TISTR : Thailand Institute of Scientific and Technology Research

This result calibrate was found accurate as shown on date place of calibrate only

This certificate is traceability to the International System of Unit (SI)

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence approximately 95 %

Calibrated by : Mr. Watchara Thongsorn

Approved by :

Mr. Ratchadawut Rungravee

Authorized Signatory

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Calibration Results

Certificate No. : WK2404-300-80

Page 2 of 2

Calibration Result of the Accuracy

Function : Conductivity Measurement

Resolution : 0.1 $\mu\text{S/cm}$, 1 $\mu\text{S/cm}$, 0.01 mS/cm

STD Solution	UUC Reading		Error	Uncertainty (\pm)
	Before Adjustment	After Adjustment		
84 $\mu\text{S/cm}$	85.1 $\mu\text{S/cm}$	same	1.1 $\mu\text{S/cm}$	0.69 $\mu\text{S/cm}$
1413 $\mu\text{S/cm}$	1413 $\mu\text{S/cm}$	same	0 $\mu\text{S/cm}$	11 $\mu\text{S/cm}$
5000 $\mu\text{S/cm}$	5002 $\mu\text{S/cm}$	same	2 $\mu\text{S/cm}$	39 $\mu\text{S/cm}$
12.88 mS/cm	12.89 mS/cm	same	0.01 mS/cm	0.098 mS/cm

(X) Without Adjustment () After Adjustment

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**** End of Certificate****



Certificate of Calibration

Certificate No.: WK2404-304-004

Page 1 of 2

Customer : C E LAB & CONSULTING CO.,LTD
245 M.4 T.NONGSAL A.DANKHUNTHOT NAKHON
RATCHASIMA, THAILAND 36220

Instrument	: Digital Thermo-Hygrometer	Ambient Temperature	: (25 ± 2) °C
Manufacturer	: KTJ	Humidity	: (50 ± 15) %RH
Model	: TA218A	Received Date	: 4-Apr-24
Serial No.	: N/A	Calibrated Date	: 4-Apr-24
Identity No.	: CE-THE-001	Issued Date	: 5-Apr-24
Range	: See to data	Calibrated Location	: In Lab
Resolution	: See to data		
Calibration Method	: CP-WK-T01		

Standard Instrument

<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Temperature & Humidity Indicator with Sensor	HTD072K230577	CC287923000003451F	9-Jul-25	SANSEL

SANSEL CALIBRATION LABORATORIES

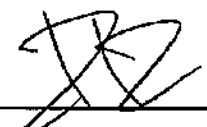
This result calibrate was found accurate as shown on date place of calibrate only

This certificate is traceability to the International System of Unit (SI)

The reported expanded uncertainty it was multipiled by a coverage factor $k = 2$ providing a level of confidence approximately 95 %

Calibrated by : Ms. Usa Phuanghiphat

Approved by :


Mr. Ratchadawut Rungravee
Authorized Signatory

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Calibration Results

Certificate No. : WK2404-304-004

Page 2 of 2

Calibration Result of the Accuracy

Function : Temperature Measurement

Range : 20 °C to 30 °C

Resolution : 0.1 °C

Unit : °C

Temperature Setting	STD Reading	UUC Reading	Error	Uncertainty (± °C)
20	20.00	20.0	0.00	0.33
25	25.00	25.1	0.10	0.33
30	30.00	30.0	0.00	0.33

Function : Humidity Measurement

Range : 30 %RH to 70 %RH

Resolution : 1 %RH

Unit : %RH

Humidity Setting	STD Reading	UUC Reading	Error	Uncertainty (± %RH)
30	30.00	30	0.00	1.5
50	50.00	52	2.00	1.7
70	70.00	72	2.00	1.8

(X) Without Adjustment () After Adjustment

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**** End of Certificate****



Certificate of Calibration

Certificate No.: WK2404-304-003

Page 1 of 2

Customer : C E LAB & CONSULTING CO.,LTD
245 M.4 T.NONGSAL A.DANKHUNTHOT NAKHON
RATCHASIMA, THAILAND 36220

Instrument	: Digital Thermo-Hygrometer	Ambient Temperature	: (25 ± 2) °C
Manufacturer	: N/A	Humidity	: (50 ± 15) %RH
Model	: HTC-1	Received Date	: 4-Apr-24
Serial No.	: N/A	Calibrated Date	: 4-Apr-24
Identity No.	: CE-THE-002	Issued Date	: 5-Apr-24
Range	: See to data	Calibrated Location	: In Lab
Resolution	: See to data		
Calibration Method	: CP-WK-T01		

Standard Instrument

<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Temperature & Humidity Indicator with Sensor	HTD072K230577	CC287923000003451F	9-Jul-25	SANSEL

SANSEL CALIBRATION LABORATORIES


This result calibrate was found accurate as shown on date place of calibrate only

This certificate is traceability to the International System of Unit (SI)

The reported expanded uncertainty it was multiplied by a coverage factor $k = 2$ providing a level of confidence approximately 95 %

Calibrated by : Ms. Usa Phuangphiphat

Approved by :


Mr. Ratchadawut Rungravee
Authorized Signatory

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Calibration Results

Certificate No. : WK2404-304-003

Page 2 of 2

Calibration Result of the Accuracy

Function : Temperature Measurement

Range : 20 °C to 30 °C

Resolution : 0.1 °C

Unit : °C

Temperature Setting	STD Reading	UUC Reading	Error	Uncertainty (± °C)
20	20.00	20.2	0.20	0.33
25	25.00	25.1	0.10	0.33
30	30.00	30.1	0.10	0.33

Function : Humidity Measurement

Range : 30 %RH to 70 %RH

Resolution : 1 %RH

Unit : %RH

Humidity Setting	STD Reading	UUC Reading	Error	Uncertainty (± %RH)
30	30.00	32	2.00	1.5
50	50.00	51	1.00	1.7
70	70.00	73	3.00	1.8

(X) Without Adjustment () After Adjustment

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**** End of Certificate****



Certificate of Calibration

Certificate No.: WK2403-300-193

Page 1 of 2

Customer : C E LAB & CONSULTING CO., LTD.
245 M.4 T.NONGSAI A.DANKHUNTHOT
NAKHON RATCHASIMA, THAILAND 36220

Instrument	: pH Meter	Ambient Temperature	: (25.0 ± 2) °C
Manufacturer	: Mettler Toledo	Humidity	: (50.0 ± 15) %RH
Model	: Seven Compact S220	Received Date	: 7-Mar-24
Serial No.	: B64122532	Calibrated Date	: 7-Mar-24
Identity No.	: CE-PHM-001	Issued Date	: 8-Mar-24
Range	: (0 to 10) pH	Calibrated Location	: Laboratories 1
Resolution	: 0.01 pH		
Calibration Method	: CP-WK-C01		

Reference Standard Instrument :

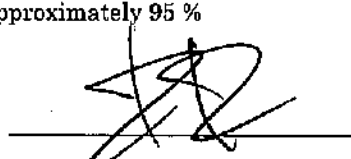
<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
pH Solution	880819	61270213	13-Mar-25	CPAchem
pH Solution	880818	61267169	13-Mar-24	CPAchem
pH Solution	880822	61260481	13-Mar-24	CPAchem
Digital Thermometer	44980762WS	WK2307-300-43	26-Jul-24	WK Electric Co.,Ltd.

This result calibrate was found accurate as shown on date place of calibrate only
This certificate is traceability to the International System of Unit (SI)

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence approximately 95 %

Calibrated by : Mr. Usa Phuanghiphat

Approved by :


Mr. Ratchadawut Rungravee

Authorized Signatory

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Calibration Results

Certificate No. : WK2403-300-193

Page 2 of 2

Calibration Result of the Accuracy

Function : pH Measurement @25 °C

Range : (0 to 10) pH

Resolution : 0.01 pH

Unit : pH

STD Solution	UUC Reading		Error	Uncertainty (± pH)
	Before Adjustment	After Adjustment		
4.01	3.79	4.01	0.00	0.0080
7.01	7.01	7.01	0.00	0.010
10.01	10.24	9.99	-0.02	0.010

Function : Temperature Measurement

Resolution : 0.1 °C

Unit : °C

STD Value	UUC Reading		Error	Uncertainty (± °C)
	Before Adjustment	After Adjustment		
25.00	25.0	same	0.0	0.18

() Without Adjustment (X) After Adjustment

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**** End of Certificate****



Certificate of Calibration

Certificate No.: WK2403-304-009

Page 1 of 2

Customer : C E LAB & CONSULTING CO.,LTD
245 M. 4 T. NONGSAI A. DANKHUNTHOT
NAKHON RATCHASIMA, THAILAND 36220

Instrument : Hot Air Oven
Manufacturer : Memmert
Model : UF55
Serial No. : B220.1879
Identity No. : CE-OVE-002
Range : 104 °C to 180 °C
Resolution : 0.1 °C
Calibration Method : CP-WK-T05

Ambient Temperature : (25 ± 2) °C
Humidity : (60 ± 20) %RH
Received Date : 7-Mar-24
Calibrated Date : 7-Mar-24
Issued Date : 8-Mar-24
Calibrated Location : Laboratory 1

Standard Instrument

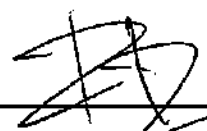
<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Data Acquisition / Switch Unit	US37029031	WK2308-302-224	28-Aug-24	WK Electric Co., Ltd.

This result calibrate was found accurate as shown on date place of calibrate only
This certificate is traceability to the International System of Unit (SI)

The reported expanded uncertainty it was multipiled by a coverage factor $k = 2$ providing a level of confidence approximately 95 %

Calibrated by : Mr. Pongpat Prasong

Approved by :


Mr. Ratchadawut Rungravee

Authorized Signatory

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Calibration Results

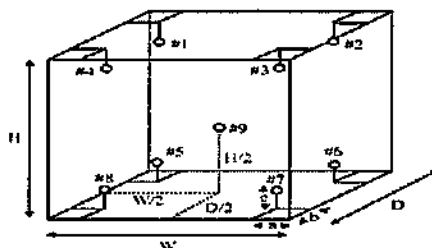
Certificate No. : WK2403-304-009

Page 2 of 2

Calibration Result of the Accuracy

Range : 104 °C to 180 °C

Resolution : 0.1 °C



Temperature Calibration

Unit : °C

Calibration Point	Measured Temperature (°C) @ Thermocouple No. (Thermocouple No. 9 is REF.)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9	
104	103.658	103.535	103.333	103.544	103.954	103.633	102.529	103.492	104.178	0.17
110	109.782	109.594	109.353	109.461	110.072	109.665	108.583	109.564	110.258	0.17
140	139.687	139.349	138.942	139.247	140.062	139.505	138.092	139.344	140.262	0.17
145	144.640	144.336	143.985	145.067	144.514	143.091	143.091	144.298	145.243	0.17
180	179.913	179.357	178.551	179.065	180.427	179.662	177.752	179.279	180.595	0.17

Unit : °C

UUC Setting	Standard Reading	Temperature Stability (±)	Temperature Uniformity	Overall Variation
104.0	103.54	0.15	0.87	1.79
110.0	109.59	0.64	1.43	1.81
140.0	139.39	0.12	1.36	2.37
145.0	144.25	0.19	2.21	2.33
180.0	179.40	0.10	2.07	2.98

Uniformity : The maximum difference of measured temperature/humidity at any sensors and measured temperature.

at the reference location which are observed at the same time or at close observation time as possible to determine the temperature pattern or homogeneity within the chamber at steady-state conditions.

Stability : The one – half of greatest maximum difference of measured temperature at any one sensor, for at least half an hour after reaching steady state or after one achieved complete cycle of control whichever comes first.

Overall Variation : the difference of the maximum and the minimum measured temperature/humidity throughout observation time.

Record time : Start time record after temperature stable. **Average*** : The average of 30 values.

Uncertainty : The report uncertainty of measurement were excluded uniformity and stability.

UUC = Unit Under Calibrate

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Certificate of Calibration

Certificate No.: WK2403-304-004

Page 1 of 2

Customer : C E LAB & CONSULTING CO.,LTD
245 M. 4 T. NONGSAI A. DANKHUNTHOT
NAKHON RATCHASIMA, THAILAND 36220

Instrument : Electronic Balance
Manufacturer : OHAUS
Model : PR4208/E
Serial No. : C233616610
Identity No. : CE-BAL-003
Range : 0 g to 4000 g
Resolution : 0.01 g
Calibration Method : CP-WK-M01

Ambient Temperature : $(25 \pm 3) ^\circ\text{C}$
Humidity : $(50 \pm 15) \% \text{RH}$
Received Date : 7-Mar-24
Calibrated Date : 7-Mar-24
Issued Date : 8-Mar-24
Calibrated Location : In Lab

Standard Instrument

<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Standard Weights Set	WK-CB-014	M2401094S	16-Jan-26	TCS
Standard Weights Set	5692	M2304106S	21-Apr-25	TCS

TCS : THAI CALIBRATION SERVICES CO., LTD.

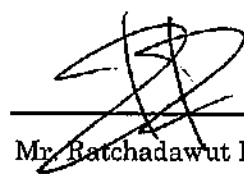
This result calibrate was found accurate as shown on date place of calibrate only

This certificate is traceability to the International System of Unit (SI)

The reported expanded uncertainty it was multiplied by a coverage factor $k = 2$ providing a level of confidence approximately 95 %

Calibrated by : Mr. Tanawat Kaidao

Approved by :


Mr. Ratchadawut Rungravee
Authorized Signatory

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Calibration Results

Certificate No. : WK2403-304-004

Page 2 of 2

Calibration Result of the Accuracy

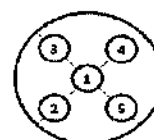
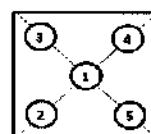
Determine of the standard deviation of weighing machine ($n = 10$)

Nominal Value g	Standard Deviation g
4000	0.000

Effect of off center loading

A mass of 1000 g was placed to various on the pan. The Weighing Machine reading error obtained is given in the table.

Unit : g					
1	2	3	4	5	Max Difference
0.00	-0.01	0.00	0.01	0.00	0.02



Departure from Normal Value

Scale Range : 0 g to 4000 g

Resolution : 0.01 g

Unit : g			
Standard Value	UUC Reading	Error	Uncertainty (\pm g)
0.00	0.00	0.00	0.0058
400.00	400.00	0.00	0.0058
800.00	800.00	0.00	0.0058
1200.00	1200.00	0.00	0.0058
1600.00	1600.00	0.00	0.0058
2000.00	2000.00	0.00	0.0058
2400.00	2400.00	0.00	0.020
2600.00	2600.00	0.00	0.020
3200.00	3200.00	0.00	0.020
3600.00	3600.00	0.00	0.020
4000.00	4000.00	0.00	0.020

Result of Calibration : No Adjustment

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**** End of Certificate****



Certificate of Calibration

Certificate No.: WK2403-304-008

Page 1 of 2

Customer : C E LAB & CONSULTING CO.,LTD
245 M. 4 T. NONGSAI A. DANKHUNTHOT
NAKHON RATCHASIMA, THAILAND 36220

Instrument : Incubator
Manufacturer : Memmert
Model : IPP55
Serial No. : V216.0305
Identity No. : CE-INC-001
Range : 20 °C
Resolution : 0.1 °C

Ambient Temperature : (25 ± 2) °C
Humidity : (60 ± 20) %RH
Received Date : 7-Mar-24
Calibrated Date : 7-Mar-24
Issued Date : 8-Mar-24
Calibrated Location : Laboratory 1

Calibration Method : CP-WK-T05

Standard Instrument

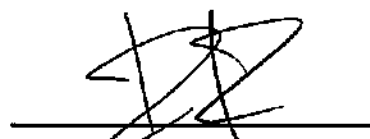
<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Data Acquisition / Switch Unit	US37029031	WK2308-302-224	28-Aug-24	WK Electric Co., Ltd.

This result calibrate was found accurate as shown on date place of calibrate only
This certificate is traceability to the International System of Unit (SI)

The reported expanded uncertainty it was multiplied by a coverage factor $k = 2$ providing a level of confidence approximately 95 %

Calibrated by : Mr. Pongpat Prasong

Approved by :


Mr. Ratchadawut Rungravee
Authorized Signatory

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Calibration Results

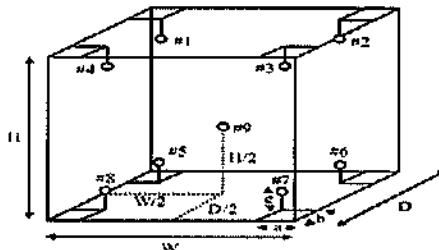
Certificate No. : WK2403-304-008

Page 2 of 2

Calibration Result of the Accuracy

Range : 20 °C

Resolution : 0.1 °C



Temperature Calibration

Unit : °C

Calibration Point	Measured Temperature (°C) @ Thermocouple No. (Thermocouple No. 9 is REF.)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9	
20	19.450	19.622	19.549	19.549	19.615	19.608	19.591	19.480	19.465	0.17

Unit : °C

UUC Setting	Standard Reading	Temperature Stability (±)	Temperature Uniformity	Overall Variation
20.0	19.55	0.08	0.17	0.26

Uniformity : The maximum difference of measured temperature/humidity at any sensors and measured temperature.

at the reference location which are observed at the same time or at close observation time as possible to determine the temperature pattern or homogeneity within the chamber at steady-state conditions.

Stability : The one - half of greatest maximum difference of measured temperature at any one sensor, for at least half an hour after reaching steady state or after one achieved complete cycle of control whichever comes first.

Overall Variation : the difference of the maximum and the minimum measured temperature/humidity throughout observation time.

Record time : Start time record after temperature stable. **Average*** : The average of 30 values.

Uncertainty : The report uncertainty of measurement were excluded uniformity and stability.

UUC = Unit Under Calibrate

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**** End of Certificate****



Certificate of Calibration

Certificate No.: WK2403-304-006

Page 1 of 2

Customer : C E LAB & CONSULTING CO.,LTD
245 M. 4 T. NONGSAI A. DANKHUNTHOT
NAKHON RATCHASIMA, THAILAND 36220

Instrument : Refrigerator
Manufacturer : Systemform
Model : MCD-10BTM
Serial No. : 94114.00
Identity No. : CE-REF-001
Range : 3 °C
Resolution : 0.1 °C
Calibration Method : CP-WK-T05

Ambient Temperature : (25 ± 2) °C
Humidity : (60 ± 20) %RH
Received Date : 7-Mar-24
Calibrated Date : 7-Mar-24
Issued Date : 8-Mar-24
Calibrated Location : Laboratory 1

Standard Instrument


<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Data Acquisition / Switch Unit	US37029031	WK2308-302-224	28-Aug-24	WK Electric Co., Ltd.

This result calibrate was found accurate as shown on date place of calibrate only
This certificate is traceability to the International System of Unit (SI)

The reported expanded uncertainty it was multiplied by a coverage factor $k = 2$ providing a level of confidence approximately 95 %

Calibrated by : Mr. Pongpat Prasong

Approved by :


Mr. Ratchadawut Rungravee

Authorized Signatory

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Calibration Results

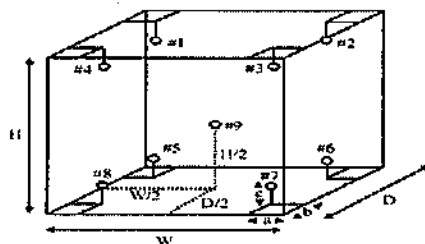
Certificate No. : WK2403-304-006

Page 2 of 2

Calibration Result of the Accuracy

Range : 3 °C

Resolution : 0.1 °C



Temperature Calibration

Unit : °C

Calibration Point	Measured Temperature (°C) @ Thermocouple No. (Thermocouple No. 9 is REF.)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9	
3	3.419	3.057	2.931	2.507	2.577	2.846	2.506	2.489	2.559	0.17

Unit : °C

UUC Setting	Standard Reading	Temperature Stability (±)	Temperature Uniformity	Overall Variation
3.0	2.77	1.43	0.92	3.31

Uniformity : The maximum difference of measured temperature/humidity at any sensors and measured temperature.

at the reference location which are observed at the same time or at close observation time as possible to determine the temperature.

pattern or homogeneity within the chamber at steady-state conditions.

Stability : The one - half of greatest maximum difference of measured temperature at any one sensor, for at least half an hour after reaching steady state or after one achieved complete cycle of control whichever comes first.

Overall Variation : the difference of the maximum and the minimum measured temperature/humidity throughout observation time.

Record time : Start time record after temperature stable. **Average*** : The average of 30 values.

Uncertainty : The report uncertainty of measurement were excluded uniformity and stability.

UUC = Unit Under Calibrate

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**** End of Certificate****



THAI HEART CALIBRATION CO., LTD.

112/1 Moo 5, Phraek Sa, Muang, Samut Prakan 10280

Tel. 0-2394-2162, 0-2757-8435, 0-2757-8496 Fax.: 0-2757-8507



CERTIFICATE OF CALIBRATION

Certificate No.: C0-0903003/24

Page 1 **of total** 3 **pages**

Customer C E LAB & CONSULTING COMPANY LIMITED
245 Moo 4 Nong Sai Subdistrict, Dan Khun Thot District,
Nakhon Ratchasima Province 36220

Equipment	Spectrophotometer		
Manufacturer	METERTECH	Model	SP-830 PLUS
Serial No.	N/A	ID No.	CE-SPE-001
Description	-		

Environmental Conditions Ambient Temperature: $(20 \pm 2) ^\circ\text{C}$
Relative Humidity: $(50 \pm 10) \%$
Atmospheric Pressure: -

Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 9 March 2024

Calibration Date 11 March 2024

Date of Issue 12 March 2024

Condition of Artifacts Used conditions but can be calibrated

Checked by

Act as Technical Manager

Approved by

Representative of Managing Director

<input type="checkbox"/> (Krisyosl K.)	<input type="checkbox"/> (Sakda Y.)
<input type="checkbox"/> (Patiphan K.)	<input checked="" type="checkbox"/> (Onnapa P.)
<input type="checkbox"/> (Pongsak H.)	<input type="checkbox"/> (Nitiphong K.)
<input type="checkbox"/> (Kanung C.)	<input type="checkbox"/> (Nonthachai K.)
<input type="checkbox"/> (Pramong P.)	<input type="checkbox"/> (Noppol P.)

(Dr. Ekachai Puttitwong)

This calibration certificate shall not be reproduced other than in full except with the prior written approval of the Thai Heart Calibration Co., Ltd.



THAI HEART CALIBRATION CO., LTD.

112/1 Moo 5, Phraek Sa, Muang, Samut Prakan 10280

Tel. 0-2394-2162, 0-2757-8435; 0-2757-8496-Fax.: 0-2757-8507



Certificate No.: C0-0903003/24

Page 2 of total 3 pages

Reference Method:

- The calibration method used was CP-004 based on an in-house method.
- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard Instruments:

Type	Model	Serial No.	Certificate No.	Due Date	Traceability
Holmium Glass Filter	RM-HG	34645	100503	Mar. 25, 2024	Starna
Didymium Glass Filter	RM-DG	11978	100499	Mar. 25, 2024	
Neutral Density Filter	RM-1N2N3N	11562	100582	Mar. 30, 2024	

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:

- Starna Scientific Ltd.

Measurement Results:

Function : No Scan

Spectral Bandwidth : 5 nm

1. Wavelength accuracy

Standard Wavelength (nm)	UUC Reading (nm)	Correction (nm)	Uncertainty (± nm)
361.40	361	0.40	0.59
537.00	536	1.00	0.59
879.68	877	2.68	0.59

Certificate No.: C0-0903003/24

Page 3 of total 3 pages

Measurement Results (Cont.):
2. Photometric Accuracy
Visible Region

Wavelength (nm)	Standard Value (A)	UUC Reading (A)	Correction (A)	Uncertainty (± A)
420	1.0572	1.057	0.0002	0.0032
	0.7481	0.748	0.0001	0.0032
	0.5529	0.552	0.0009	0.0032
440	1.0353	1.032	0.0033	0.0032
	0.7311	0.728	0.0031	0.0032
	0.5432	0.540	0.0032	0.0032
465	0.9650	0.964	0.0010	0.0032
	0.6749	0.674	0.0009	0.0032
	0.4937	0.492	0.0017	0.0032
546.1	0.9959	0.995	0.0009	0.0032
	0.6850	0.684	0.0010	0.0032
	0.5082	0.507	0.0012	0.0032
590	1.0356	1.034	0.0016	0.0032
	0.7147	0.713	0.0017	0.0032
	0.5369	0.536	0.0009	0.0032
635	0.9878	0.985	0.0028	0.0032
	0.6826	0.679	0.0036	0.0032
	0.5216	0.521	0.0006	0.0032

UUC : Unit Under Calibration.

The above reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -



S.A.(KHONKAEN) Co.,Ltd.

555/28 Moo.13 Kasikornthungsang Rd, Mueang Khon Kaen District, Khon Kaen 40000

Tel. 043238500-1 Fax. 043238502

www.sa-khonkaen.com Email: office@sa-khonkaen.com

SERVICES REPORT

Service Order No. 28688

Service Confirmation No. 57983

Customer Details	
Contact Person: คุณมนตรี	Company Name: บริษัท ซี อี แล็บแอนด์คอนเซาท์ติ้ง จำกัด
Email: celab@outlook.co.th	Site Address: 555/2 หมู่ที่ 17 ตำบลบ้านเพชร อำเภอป่าเมรุจตุรรงค์ จังหวัดชัยภูมิ
Phone No.: 0866002810	36160

Instrument Details		
Model	Serial	Brand
ETHOS EASY	KK-17052207	MIL

Incident Category	
Service Category : Service	Service Organization : KK-SLSV-SV
Incident Category : Contract	Service Execution Team : KK-SLSV-SV

Incident Description
Preventive Maintenance เครื่อง Microwave

Work Description
Preventive Maintenance เครื่อง Microwave # 1/2 เปลี่ยน HV. และ Cap Day 1 วันที่ 23-04-2567 เวลา 13:00 - 17:00 น. ทำ PM เช็ค Temp 3 จุด ที่ 50°C, 100°C และที่ 200°C ให้ลูกค้า ทำการเปลี่ยน capacitor 2 ชิ้นให้ลูกค้าและ Diode 2 ชิ้น, ทำความสะอาดเครื่องให้ลูกค้าใหม่ ทดสอบรัน 1800 W ก่อนประกอบตัวผ่าน, ทำการประกอบเครื่องและเช็คในตัวเครื่องใหม่ รับการทำงาน 1800 W เช็คระบบไฟ -ปกติ Day 2 วันที่ 24-04-2567 เริ่มเวลา 08:30 น. ทดสอบตัวอย่างลูกค้า ทดสอบระบบการทำงาน ปกติ เครื่องใช้งานได้ปกติ

Spare Parts			
No.	Product ID	Qty.	Description

Remark Description
ATC-0100:1, HV Capacitor:2, HV Diode:2

Job Status: ☒ Complete ☐ Incomplete ☒ Charge ☐ Free of Charge

Arrival Time: 2024-04-23 13:00 Engineer Name: Watchara Wangprayot

Departure Time: 2024-04-24 12:00 Mobile No.: +66 (83) 3038083

Total Time: 7 Hour(s) 30 Min(Email: service@sa-khonkaen.com

Customer:

Signature:

Date : 2024-04-24 12:03



S.A.(KHONKAEN) Co.,Ltd.

555/28 Moo.13 Kasikomthungsang Rd, Mueang Khon Kaen District, Khon Kaen 40000

Tel. 043238500-1 Fax. 043238502

www.sa-khonkaen.com Email: office@sa-khonkaen.com

SERVICES REPORT

Service Order No. 29277

Service Confirmation No. 57984

Customer Details			
Contact Person: คุณมนตรี	Company Name: บริษัท ซี อี แล็บแอนด์คอนเซปต์ตั้ง จำกัด		
Email: celab@outlook.co.th	Site Address: 555/2 หมู่ที่ 17 ตำบลบ้านเพชร อำเภอบ้านหมี่จตุรพักตรพิมาน จังหวัดชัยภูมิ		
Phone No.: 0866002810	36160		
Instrument Details			
Model	Serial	Brand	
ETHOS EASY	KK-17052207	MIL	
Incident Category			
Service Category : Service	Service Organization : KK-SLSV-SV		
Incident Category : Repair	Service Execution Team : KK-SLSV-SV		
Incident Description			
ATC-400 Sensor, length 180 mm, for SK15A ชำรุด			
Work Description			
ATC-400 Sensor, length 180 mm, for SK15A ชำรุด -นำอะไหล่ ATC-400 Sensor, length 180 mm = 1 ชิ้น มาเปลี่ยน ใบเสนอราคาเลขที่ 36205 (ของเดิมชำรุด) -ทดสอบการทำงาน เครื่องสามารถใช้งานได้ปกติ			
Spare Parts			
No.	Product ID	Qty.	Description
Remark Description			
เข้ามาเปลี่ยนพร้อมกับทำ PM.			

Job Status: ☒ Complete ☐ Incomplete ☒ Charge ☐ Free of Charge

Arrival Time: 2024-04-23 13:00 Engineer Name: Watchara Wangprayot

Departure Time: 2024-04-23 16:30 Mobile No.: +66 (83) 3038083

Total Time: 3 Hour(s) 30 Min(Email: service@sa-khonkaen.com

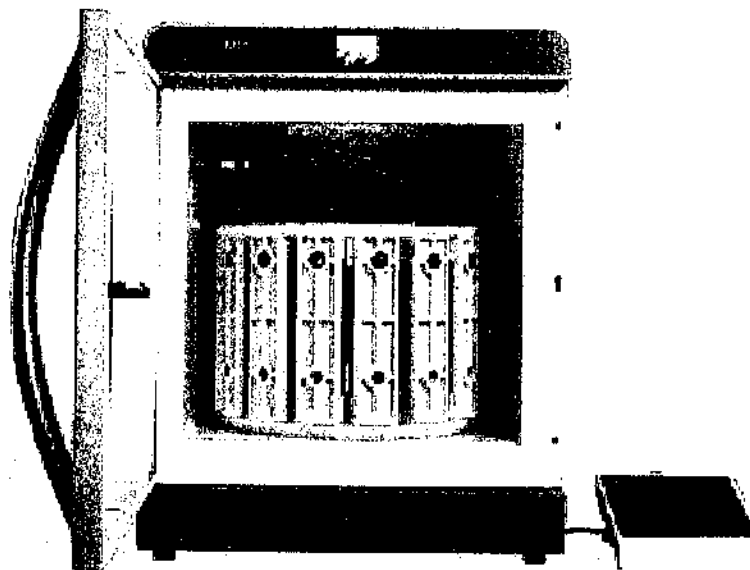
F-SER-01 R:00

Customer

Signature:

Date : 2024-04-23 17:04

**Preventive Maintenance and Performance Verification
Milestone Ethos UP /Ethos EASY Microwave
System**



SITHIPORN ASSOCIATES CO.,LTD.
451-451/1 Sirinthorn Road, Bangbumru,Bangplud, Bangkok 10700 Thailand
Tel. (662) 433-8331, 434-9191 fax: (662) 433-1679,434-9510

Milestone Ethos UP /Ethos EASY Microwave System

SERVICE PROTOCOL REPORT

Customer information:

Company:	บริษัท ซี อี แล็บแอนด์คอนเซพท์ติ้ง จำกัด
Department:	LAB
Person in charge:	คุณ มนต์รี
Address:	555/2 หมู่ที่ 17 ตำบลบ้านเพชร อำเภอป่าเห็ญณรงค์ จังหวัดชัยภูมิ 36160
Tel.:	+66 866002810
E-mail:	celab@outlook.co.th

Technical data:

MW Unit, type and Serial Number:	Ethos Easy	SN: 17052207
Terminal, type and Serial Number:	Terminal-480	SN: 17051207
Software, type and revision:	Easycontrol	Rev.02-B-SP3
Accessories (rotor, reactor...) types:	Rotor	SK-15
VAC unit, type and serial number (if present):	-	SN-
Cooling chiller, type and Serial Number (if present):	-	SN:
Dosing station, type and Serial Number (if present):	-	SN-
Installation and last maintenance dates:	Inst. on:	Visit. on: 24/04/2567

NOTE: once concluded the following protocol, a filled in and signed copy of this report should be sent to Milestone srl at: service@milestonesrl.com

1. VISUAL INSPECTION

	OK	Not OK	Corrosion
External chassis – check general conditions	✓		
Internal cavity – check general conditions and integrity Teflon coating	✓		
Door – check general conditions and correct functionality	✓		
Screws – check condition and availability	✓		
Feet – check condition and solidity	✓		
Exhaust hose – check cleaning and proper connection to a suitable exhaust line	✓		
Power supply cord – check integrity, firm plugging and ground connection	✓		
Working site – check clearances, bench and environmental conditions	✓		

2. ELECTRICAL SAFETY TEST

Using a suitable testing device (e.g. SECUTEST SIII), check the below reported parameters and take note of the results.

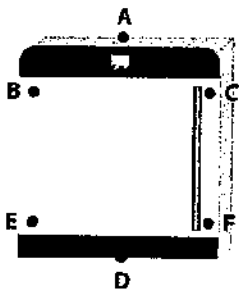
Parameter	Result	OK	Not OK
Voltage L N: 220 VAC	Actual value: 213 Vac	✓	
Ground N G: ≤ 2 VAC	Actual value: 0.1 Vac	✓	

3. MW LEAKAGE TEST

Insert into the cavity a vessel filled in with 275±15ml of water.

Using a MW leak tester, check the MW leakage radiation all around the unit and in particular around the critical points shown in the picture.

Report the measured value in the chart.

	POSITION	RESULT (mW/cm²)
	A	0.00 mw
	B	0.00 mw
	C	0.00 mw
	D	0.00 mw
	E	0.00 mw
	F	0.00 mw
Maximum allowed leakage: 1mW/cm² max (ref. standard: IEC/EN 61010-2-010, IEC/EN 60335-2-90)		

4. MW OUTPUT POWER TEST

Open the "1000" panel on the terminal *Panel Administration* program.

Load a suitable borosilicate glass container (19cm diameter, 9cm height) with 1000ml of water and place it in the cavity.


According to normative IEC 60705 the water temperature must be 10°C ±1°C

With an external thermometer measure the *Start temperature* of water and report it on the related field.

Start the test, by heating the water for 1 minute at 100% power (1800W Ethos UP or X, 1500W Ethos1)

With the external thermometer, measure the *End temperature* and report it on the related field.

Take note of the obtained result from the *Calculated Energy* field

	MEASURED MAX POWER	1813 W
	Start T1 = 31.1 °C, Start T2 = 57.0 °C	
Acceptable result, brand new unit ⁽¹⁾ :	≥ 90 of nominal power(1620 W)	
Acceptable result, old unit ⁽¹⁾ :	≥ 80% of measured power when unit was new(1200 W)	

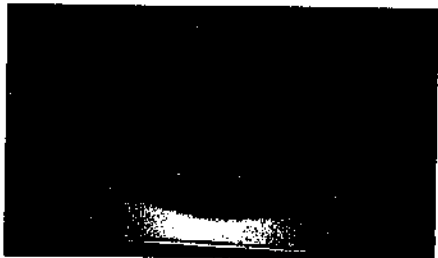
⁽¹⁾Recommended tolerance based on normal power supply testing conditions (230VAC)

5. MW HOMOGENEITY DISTRIBUTION TEST

Fill in with 100ml water n°5 vessels (PN 70625)⁽²⁾ and place them on the rotating holding plate (PN 70405)⁽²⁾. With an external thermometer measure the water starting temperature of each vessel and report into the table.

Run an heating program at 50% of Max nominal power for 1 minute.

With an external thermometer measure the water final temperature of each vessel and report into the table. Calculate and report the difference of temperature (ΔT) for each vessel.

	Position	T start	T final	ΔT
	1	27°C	50°C	23
	2	27°C	49°C	22
	3	27°C	48°C	21 (T Min)
	4	27°C	51°C	24 (T Max)
	5	27°C	49°C	22
Recommended acceptable result: Maximum $\Delta T < 7^\circ\text{C}$ $\Delta T 3^\circ\text{C}$, $T_{\text{max}} - T_{\text{min}} < 7^\circ\text{C}$				

⁽²⁾ Included in the Microwave cavity performance kit (PN 70630).

6. TEST OF FUNCTION

	OK	Not OK	N.A.
Main switch - check if the unit turns on/off	✓		
Cavity illumination - check if the led boards work properly	✓		
Turntable motor - check the regular rotation of carousel motor, adapter, 360° twist and position calibration.(section 4.4.3)and test run to find ODD /EVEN position.	✓		
Diffuser motor - check the regular rotation without abnormal friction	✓		
Exhaust motor - check if the fan is sucking air from the cavity	✓		
Magnetron cooling fan/s - check if the fan/s is cooling down the magnetron/s	✓		
Safety switches - check if the door safety switches are properly activated when the door is closed/opened	✓		
Cavity camera - check the correct functionality of camera on terminal display			✓
Door locking electropiston - check correct activation according to T1 temperature	✓		
Magnetic Stirrer - check that the stirrer is rotating properly at 100%, and max current			✓

7. TERMINAL

	OK	Not OK	N.A.	Readjusted
Display - check/adjust the brightness and correct functionality	✓			
Touch screen - check functionality and calibration	✓			
Interface cable - check condition and firm connection	✓			
Free memory - check size, in case erasing files ,USB reading			✓	
Actual Date and time - check correctness			✓	
Mouse (optional)			✓	
Keyboard (optional)			✓	

8. SENSORS TEST



setting page .

Condition, calibration and functionality to be checked according to the related service manual

Type of sensor	Re-calibrated	OK	Not OK	N.A.
ATC-400 (thermocouple temperature sensor)		√		
ATC-FO (fiber optic temperature sensor)				√
IRTC (infrared temperature sensor) , section 5.3.1 Heat the water up to around 90°C				√
APC55 (pressure sensor)		√		
AVC (vacuum sensor)				√
QP (acid / solvent gas sensor) Type:Acid		√		
CCS (cavity control system sensor):				

9. ACCESSORIES CHECK

The condition of each component has to be visually checked and tested according to the related User and Tips & Techniques manuals. Particular attention should be paid to marks of crack, deformation, discoloration, corrosion.

Specify quantity:	OK	Not OK	N.A.
Rotor body	1pcs	pcs	
Segment body	15pcs	pcs	
Pressure screw	1pcs	pcs	
Indicator ring	pcs	pcs	√
Covers	pcs	pcs	√
Adapter plate	15pcs	pcs	
Pressure release spring/valve	15pcs	pcs	
Vessels	15pcs	pcs	
Protection shield	15pcs	pcs	
Thermowell / sealing screw (only for reference vessel)	1pcs	pcs	
Pressure sensor tubing	1pcs	pcs	
Torque wrench			

10. REPLACED SPARE PARTS

PN	DESCRIPTION	Q.ty

	OK	Not OK
All screws inserted and tightened	✓	
Safety devices fully checked	✓	
All exhaust and cooling fans are functioning	✓	
Necessary tools available at customer's site	✓	
Last revision of User Manual and required tools available at customer's site	✓	
Advised customer about care and maintenance instructions	✓	

Setting point Temperature (°C)	Temperature of Instrument (°C)	Temperature of the Black body (°C)	Tolerance	OK	Not OK
Testing conditions 26.5 °C Room temperature at ± 3 °C					
50°C	50°C(50°C)	50 °C	± 3°C	√	
100°C	100°C(100°C)	100 °C		√	
200°C	200°C(200°C)	200 °C		√	

* Temperature of Instrument (°C) ค่าในวงเล็บคือค่าที่เครื่องต้องอ่านได้ ค่าที่อยู่นอกวงเล็บคือค่าที่เครื่องอ่านออกทั้งหมด

Instrument/Measurement Device :

Instrument/Measurement	Model	Serial	Cert. No.	Due Date
The Blackbody Device	BB500	180500006	SPR23060198-1	16/06/2025
True RMS Multimeter with TC Sensor	179	14620446	TEI22037	21/12/2025

Working hours:

Date	Service Engineer Name	Service Engineer Signature
24/04/2567	จักรพงษ์ หักคำตัน	จักรพงษ์
Laboratory Manager / Person in charge acceptance signature:		

Avio200 Preventive Maintenance Report

Company Name: C E LAB & CONSULTING CO., LTD.


Instrument Location: 245 M. 4 T. Nongsai, A. Dan Khunthot,
Nakhon Ratchasima Thailand 36220.

Instrument Serial No.: 079S17011701

Date: 21-Feb-2024

ICP-OES/Avio200 Preventive Maintenance (PM)

Company Name:	C E LAB & CONSULTING CO., LTD.		
Address (Instrument Location):	245 M. 4 T. Nongsa, A. Dan Khunthot, Nakhon Ratchasima 36220.		
Serial Number:	079517011701	PM Number:	2 OF 2
Customer Name (if applicable):	K. Sittiwat	Telephone Number:	093-581-0155
Service Engineer Name:	K. Piyawit	Service Order Number:	WO-02606776
Date PM Performed: (DD-MMM-YYYY)	21-Feb-2024	Next PM Due Date: (DD-MMM-YYYY)	21-Aug-2024
Standard Labor Hours to Complete PM :		4 hours	

Part Number	Release	Publication Date	
TH09370183 Rev.1	B	July 2020	

Scope

The purpose of this PM is to ensure the continued functionality of the PerkinElmer/Avio200 by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer.

The customer should save their method before the PM begins.

General Instructions:

The customer must provide the engineer operational data to demonstrate recent instrument performance prior to starting the PM. Always check with the customer before making any changes that may affect the customer's analysis or calibration, including a current back-up of system software and/or data files. The completed document should be signed by an authorized PerkinElmer and customer representative and left with the customer. Update the PM sticker and instrument logbook as required.

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Component List

Component / Specific Model	Serial #	Configuration Notes
Avio200	079S17011701	Syngistix V.2.0.4.3510

Parts Lists

Parts Included with the PM		
Part Number (if applicable)	Description	Quantity
09995098	Air Filter-Spectrometer	Not Applicable
N077520	Air Filter-RF Generator	Not Applicable
09992731	Axial Window	Not Applicable
B0810377	Radial Window	Not Applicable
N0770438	O-ring kit, injector support adapter	Not Applicable
N0780437	O-ring kit, torch	Not Applicable

Additional Reagents and Standards Required for PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date: (MM/YY)
N0691579	Multi-Element Standard (N069-1579 diluted 10X)	1	7-263MFX1	30-Apr-2024
N9300221	Instrument Calibration-4 (N9300221 diluted 100X)	1	59-091CRY1	30-June-2024

Procedure Checklist

Use (✓) to check off those steps in the checklist that have been completed.

1. General:

- ☒ Ask customer about unit's performance since last visit.
- ☒ Check incoming AC line voltage under load for proper levels and grounding.
- ☒ Is the instrument operational?

2. Mechanical:

- ☒ Inspect and clean all fans and filters.
- ☒ Inspect and replace torch components and necessary.

Torch Components Replaced: ☒ Yes ☐ No

If yes, list components replaced:

- ☒ Inspect all tubing for signs of cracking or leaking and replace as necessary.

Tubing Replaced: ☒ Yes ☐ No

If yes, list tubing replaced:

- ☒ Inspect the peristaltic pump for proper operation.
- ☒ Check and adjust if necessary, the external nitrogen, argon shear gas and water supply pressures.
- ☒ Check and adjust if necessary, the internal nitrogen, main argon, torch argon and shear gas pressures

Regulator	Measured Pressure	Set Pressure
Nitrogen	N/A	NA (calibrated in Factory)
Main Argon	76 psig	76psig
Torch Argon	67 psig	67psig
Shear Gas	65 psig	65psig
Water	35 psig	35psig

- ☒ Check the shear gas nozzle for blockages and proper, uniform flow.
- ☒ Inspect nitrogen Hi/Low purge and shear gas solenoids for proper function.
- ☒ Inspect the function of all spectrometer motors. Drive the motors from the Spectrometer DCM. Check all motors, couplings, set screws, gears or drive assembly located on the spectrometer (prism/grating wavelength drives, slits, shutter, DV mirror, X/Y mirror) if problems are found.
- ☒ Perform preventative maintenance on the chiller as required. Make the customer aware of the importance of maintaining the chiller fluid level and filter replacement.
- ☒ Drain air compressor surge tank.
- ☒ Clean exterior of instrument.

3. Electrical:

- ☒ Visually inspect all PC boards for cleanliness and signs of corrosion.
- ☒ Check all RF generator and spectrometer power supply voltages.
- ☒ Run instrument diagnostic checks from the appropriate Device Control Module.

RF Generator:

- ☒ Check the RF generator status screens.
- ☒ Check the function of all Interlocks.

Spectrometer:

- ☒ Check the spectrometer status screens.
- ☒ Check for proper function of all motors from the Motor Control window.

4. Optical:

- ☒ Check the neon lamp for proper operation.
- ☒ Ensure that neon initialization passes at power up.
- ☒ Ensure that there is a single, well defined peak of sufficient intensity (approximately 15,000 to 60,000 cts.) for the 703.241nm neon line viewed in the DCM Collect Spectra window. Re-generate the neon correction table if problems are encountered. If problems are still exhibited after the table is re-generated, replace the neon lamp assembly.

Neon Lamp Replaced: ☐ Yes ☒ No

- ☒ Perform the Initialize Optics routine from the Spectrometer Control window.
- ☒ Insure that the routine passes with no error codes. If it fails, run a manual prism scan from the spectrometer DCM.
- ☒ Insure the Dark Current measurement (Detector Calibration) passes at initialization.
- ☒ Check the shutter home sensor position.
- ☒ Check prism/electronics temperature sensor readback values from the DCM. It is normal for these readings to be shown in red. A typical prism temperature is approximately 29.5 degree C. A typical electronics temperature is approximately 35 degree C.
- ☒ Check the detector temperature from the DCM for -7.0 to -8.5 degree C. If outside of this range the detector cooling fan may not be operational. Further inspection may be necessary.
- ☒ Inspect for proper function of the transfer optics. 1) shutter 2) DV mirror 3) X/Y mirror.
- ☒ Clean or replace the axial and radial view windows as necessary.

Axial Window Replaced: ☐ Yes ☒ No

Radial Window Replaced: ☐ Yes ☒ No

5. Post PM Performance Tests:

- ☒ Perform View Align.

Test Spectral Resolution:

- ☒ Measure the spectrometers ability to separate two adjacent wavelengths.

Parameter	Specification	Test Result	Pass/Fail
As 193.696 - Resolution	≤0.009	0.00825	Passed
Ni 231.604 - Resolution	≤0.011	0.00938	Passed
Ni 341.476 - Resolution	≤0.015	0.01420	Passed
Ba 455.403 - Resolution	≤0.020	0.01848	Passed

Test Precision

☒ Test for reproducibility of a set of measurement.

Parameter	Specification	Test Result	Pass/Fail
Zn 213.856	%RSD \leq 1 %	0.88%	Passed
Mg 280.856	%RSD \leq 1 %	0.33%	Passed
Mg 285.207	%RSD \leq 1 %	0.16%	Passed
Ba 455.403	%RSD \leq 1 %	0.18%	Passed

Test MnBEC:

☒ Run Axial and Radial BEC according to the A&T spec, or the commissioning test procedure.

Mn Background Equivalent Concentration:

Method "MnBEC" For Samples "IB (2%HNO3)" and "IS (N069-1579/10)", record intensities.

Calculated BEC: $BEC = (IB * Conc\ of\ Std) / (IS - IB)$. Where Conc of Std = 1,000 PPB

Element	Mode	Conc.	IB	IS	
Mn 257.610	Radial	1,000 ppb	105,928.3	19,270,432.5	
Mn 257.610	Axial	1,000 ppb	112,167.3	19,088,535.5	
Mn 257.610	IB*Conc.	IS - IB	BEC	Spec	Pass/Fail
Radial	105,928.3	19,164,504.2	6.37	<30 PPB	Passed
Axial	112,167.3	18,976,368.2	6.54	<30 PPB	Passed

6. Review:

- ☒ Review with the customer PM work performed.
- ☒ Discuss recommended customer supplied materials to have on hand.
- ☒ Attach PM sticker.

Additional Comments

Additional Comments Regarding the PM	

Review

<p><i>The preventive maintenance checks and if applicable performance tests for ICP-OES/Avio200 have been completed.</i></p>	
<p><i>This ICP-OES/Avio200 Passes <input checked="" type="checkbox"/> Fails <input type="checkbox"/> the preventive maintenance.</i></p>	
<p>Review of Preventive Maintenance:</p>	
<p>Authorized PerkinElmer Representative:</p> <p style="text-align: right;">D. S.</p>	<p>Date:</p> <p style="text-align: right;">21-Feb-2024</p> <p style="text-align: right;">(DD-MMM-YYYY)</p>
<p>Authorized Customer Representative:</p>	<p>Date:</p> <p style="text-align: right;">21-Feb-2024</p> <p style="text-align: right;">(DD-MMM-YYYY)</p>

Service Report

Work Order Number	Activity Code	Billing Type	Requested Start Date	Model	Serial Number
WO-02608776	Planned Maintenance	Contract	14/12/2568 20:55 น.	ICPN0790011	079S17011701
Service Representative Name	Contract Number	Expiry Date	Equipment ID	System ID	
Sompanithan, Piyawit	SC-0035625087	14/07/2024	N/A	N/A	
UDI Number					
N/A					
Equipment Location			Bill To Name		
บริษัท ซี อี แล็บ เทคโนโลยี จำกัด สำนักงานใหญ่ ชั้น 6 36160 TH			บริษัท ซี อี แล็บ เทคโนโลยี จำกัด สำนักงานใหญ่ ชั้น 6 36160 TH		
Customer Contact	Phone Number	Fax Number	Email	Purchase Order	
คุณกฤษณ์ ลิ้มผลา	093-581-0155	N/A	ce-lab@hotmail.com	POC2307-0008	

Work Description		
1. Discuss any issues with the customer prior to starting. 2. Perform to preventive maintenance checklist (2OF2) 3. Clean system/Clean sample introduction. 4. Instrument performance test-passed. 5. Confirm by customer method-passed		
Start Date	End Date	Work Description
21/02/2024	21/02/2024	
21/02/2024	21/02/2024	

Tools Used					
Quantity	Calibrated Tool	Description	Serial Number	Last Calibration Date	Next Calibration Date
*** No Calibrated Tools Used ***					

Material Used				
Part Number	Part Description	Note	Lot/Serial Number	Quantity
*** No Parts Used ***				

Labour Details			
Part Number	Part Description	Start Date	Quantity
SV000013	Preventative maintenance	21/02/2024	6
SV000002	Service Travel	21/02/2024	6

Work Complete Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> PM/DQ/IPV Left with Customer Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Customer Signature ลีหวิจัน 21/2/2567 คุณกฤษณ์ ลิ้มผลา	Technician Signature Pts. 21/2/2567 Sompanithan, Piyawit
---	--	--

Terms & Conditions

Customer Acknowledgment of receipt of the above repair / replacement.

Special Terms and Conditions: This is not an Invoice.

Taxes will be applied to your Invoice if applicable.

PerkinElmer TruQ

Atomic Spectroscopy Standard



Certificate of Analysis

PerkinElmer Number: N0691579

Description: Multi-Element Standard

Matrix: 2% HNO₃

Lot Number: 7-263MFX1

Certification Date: OCT -- 2022
Expiration Date: APR 30 2024

* Instrumental Analysis using ICP Spectrometer:

Analyte	Labeled	Measured	SRM	Analyte	Labeled	Measured	SRM
As	50.0 µg/mL	49.8 µg/mL	3103a*	Ni	10.0 µg/mL	9.95 µg/mL	3136*
K	50.0 µg/mL	49.5 µg/mL	3141a*	Sr	10.0 µg/mL	9.96 µg/mL	3153a*
La	10.0 µg/mL	9.89 µg/mL	3127a*	Zn	10.0 µg/mL	9.96 µg/mL	3168a*
Li	10.0 µg/mL	9.91 µg/mL	3129a*	Ba	1.00 µg/mL	0.994 µg/mL	3104a*
Mn	10.0 µg/mL	9.91 µg/mL	3132*	Mg	1.00 µg/mL	0.995 µg/mL	3131a*

* - indicates NIST SRM

† - indicates CRM (when NIST SRM is not available)

Reference Multi: Lot# 57-138CR, 58-199CR

Refer to side 2 for details of certification.

Balances are calibrated with weight sets traceable to NIST.

We guarantee that our PerkinElmer TruQ Atomic Spectroscopy Standards are stable and accurate to $\pm 0.5\%$ of certified concentration until the expiration date, provided the standards are kept tightly capped and stored under normal laboratory conditions. This value is the sum of cumulative errors associated with the analytical determinations, pipetting, and diluting to final volume. For these solutions we use high purity acids, ASTM Type I water (18 megohm double deionized), and leached, triple-rinsed bottles. All glassware used is class A.



PerkinElmer®

Certifying Officer:

Y. Parikh

PerkinElmer, Inc.

U.S.A. Tel: 1-203-925-4800

U.S.A. Toll Free: 1-800-762-4000

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PerkinElmer TruQ

Atomic Spectroscopy Standard



Certificate of Analysis

PerkinElmer Number: N9300221

Description: Instrument Calibration Standard 4

Matrix: 5% HNO₃

Lot Number: 59-091CRY1

Certification Date: DEC - - 2022

Expiration Date: JUN 30 2024

* Instrumental Analysis using ICP Spectrometer:

Analyte	Labeled	Measured	SRM	Analyte	Labeled	Measured	SRM
As	100 µg/mL	100 µg/mL	3103a*	Pb	50.0 µg/mL	49.8 µg/mL	3128*
Tl	100 µg/mL	100 µg/mL	3153*	Se	50.0 µg/mL	50.1 µg/mL	3149*
Cd	50.0 µg/mL	50.0 µg/mL	3108*				

* - Indicates NIST SRM

† - Indicates CRM (when NIST SRM is not available)

Reference Multi: Lot# 54-134CR, 57-156CR, 58-169CR

Refer to side 2 for details of certification.

Balances are calibrated with weight sets traceable to NIST.

We guarantee that our PerkinElmer TruQ Atomic Spectroscopy Standards are stable and accurate to $\pm 0.5\%$ of certified concentration until the expiration date, provided the standards are kept tightly capped and stored under normal laboratory conditions. This value is the sum of cumulative errors associated with the analytical determinations, pipetting, and diluting to final volume. For these solutions we use high purity acids, ASTM Type I water (18 megohm double deionized), and leached, triple-rinsed bottles. All glassware used is class A.

Certifying Officer:

Y. Parikh



PerkinElmer, Inc.

U.S.A. Tel: 1-203-925-4600

U.S.A. Toll Free: 1-800-762-4000

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แบบฟอร์มตรวจเช็คตู้ดูดควัน

FUME HOOD CHECKLISTS



TEST REPORT

รับประกัน/warranty _____ ปี/years
วันเริ่มประกัน/Start date _____
วันสิ้นสุดประกัน/End date _____

PREVENTIVE MAINTENANCE / โปรแกรมการตรวจเช็ค

☒ 1 ครั้ง/ปี ☐ 2 ครั้ง/ปี ☐ 3 ครั้ง/ปี ☐ 4 ครั้ง/ปี
Time/Year Time/Year Time/Year Time/Year
1st Check _____ 2nd Check _____ 3rd Check _____ 4th Check _____

ชื่อลูกค้า

Client's Name _____ CE LAB & CONSULTING CO.,LTD Job No. _____ 567-051

สถานที่ติดตั้ง

Location _____ จ.นครราชสีมา ห้อง _____ Laboratory I ชั้น _____ 1

ขนาดตู้ดูดควัน

Fume Hood size ☒ 1200 mm. ☒ 1500 mm. ☐ 1800 mm. ☐ 2000 mm.

Fume Hood Model

FH45-15

Serial Number

Fume Hood I

ตัวตู้ดูดควัน/โครงสร้างภายนอก

Fume hood checklists

- ☒ ไม่มีรอยขีดข่วนที่ใหญ่ สังเกตได้ชัด
No major damage or scratch on the hood
- ☒ ไม่มีการแตกร้าวของตัวตู้
No crack on the hood
- ☒ ไม่มีคราบสกปรกต่าง ๆ ที่ไม่สามารถเช็ดออกได้ง่าย
No stain on the hood
- ☒ หน้าบาน (กระจก/ลูกรอก/สลิง) สามารถใช้งานได้ปกติ
Panels (windows/pulley/sling) are fully function
- ☒ สีน้าตรงสเปก ถูกต้องตามรุ่น
Fume hood is corrected according to the specification

ระบบคอนโทรล/ไฟฟ้า/มอเตอร์/พัดลม

Control panel/Electrical system/Motor/Fans checklists

- ☒ ไฟแสดงสถานะต่างๆ ติดเป็นปกติ
All light indicators are fully glow
- ☒ สวิตช์ต่างๆ เปิดใช้งานได้เป็นปกติ
All switches are fully functional
- ☒ ระบบไฟฟ้าแสงสว่างใช้งานได้ปกติ
All lighting is fully functional
- ☒ ปุ่ม Option เสร็มอื่นๆ ใช้งานได้ตามคำสั่ง
All switches and bottoms are fully functional
- ☒ ปลั๊กไฟใช้งานได้ปกติ
All power plug are fully functional
- ☒ มอเตอร์ใช้งานได้ปกติ
Motor is fully functional
- ☒ พัดลมใช้งานได้ปกติ
Fan system is fully functional

ระบบน้ำ/ระบบแก๊ส

Gas/water system checklist

- ☒ ท่อน้ำใช้งานได้เป็นปกติ
Water tap is fully functional
- ☒ ท่อแก๊สใช้งานได้เป็นปกติ
Gas tap is fully functional
- ☒ ระบบการทำงานของท่อน้ำ/น้ำทิ้ง ทำงานได้ปกติ
Cold water/drain pipe are fully functional

อุปกรณ์เสริม (ถ้ามี)

Additional Accessories (Check if included)

- ☒ ลมเป่าหน้าตู้ใช้งานได้ปกติ
Auxiliary air is fully functional
- ☒ ระบบชุดดักไอสารเคมีใช้งานได้ปกติ
Fume scrubber is fully functional
- ☐ สเปรย์น้ำ/water spray ☐ ฟิลเตอร์/Filters

ชุดดักไอสารเคมี (ถ้ามี)

Fume Scrubber (Check if included)

- ☒ โครงสร้างทั่วไปปกติ
Overall structure is not damaged
- ☒ ระบบการทำงานของเครื่องเป็นปกติ
System is fully functional
- ☒ ระบบควบคุมทำงานได้ปกติ
Control system is fully functional
- ☒ มอเตอร์ปั๊มน้ำทำงานได้ปกติ
Water pump motor is fully functional
- ☒ ลูกลอยควบคุมมอเตอร์ทำงานปกติ
Floating valve fully controls motor is fully functional
- ☒ ลูกลอยควบคุมตัวเติมน้ำทำงานปกติ
Floating valve kit is fully functional
- ☒ วาล์วน้ำดื่มใช้งานปกติ
Cold water valve is fully functional
- ☒ วาล์วน้ำทิ้งใช้งานปกติ
Wasted valve is fully functional
- ☒ หัวสเปรย์น้ำใช้งานปกติ
Water spray is fully functional
- ☒ ไม่มีน้ำรั่ว
No water Leakage

ผลการตรวจวัด/Test Report

ความเร็วลม/Velocity	ผ่าน/Yes	ไม่ผ่าน/No
เปิด 30 cm ค่าที่วัดได้		
Sash open at 30 cm. 129 ft/min	<input checked="" type="checkbox"/>	<input type="checkbox"/>
เปิด 50 cm ค่าที่วัดได้		
Sash open at 50 cm. - ft/min	<input type="checkbox"/>	<input type="checkbox"/>
เปิด 60 cm ค่าที่วัดได้		
Sash open at 60 cm. - ft/min	<input type="checkbox"/>	<input type="checkbox"/>
ค่าความเร็วลมเฉลี่ย		
Average >100 ft/min 129 ft/min	<input checked="" type="checkbox"/>	<input type="checkbox"/>

แสงสว่างและเสียง (ONLY PREVENTIVE MAINTENANCE)

แสงสว่าง ค่าที่วัดได้	416 Lux	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Lighting >400 Lux			
เสียง ค่าที่วัดได้	77 dB (A)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sound <85 dB(A)			

อื่นๆ/ข้อเสนอแนะ/Other Suggestions

Air Flow Sensor ชำรุด

Hotline Service 0-2431-6061-6



S.K. POWERABLE CO.,LTD.

Tel 0-2431-6061-6 www.skpower.co.th

F-SA-18-01

08 / 07 / 2024

Checker / ผู้ตรวจสอบ

แบบฟอร์มตรวจเช็คตู้ดูดควัน

FUME HOOD CHECKLISTS



TEST REPORT

รับประกัน/warranty _____ ปี/years
วันเริ่มประกัน/Start date _____
วันสิ้นสุดประกัน/End date _____

PREVENTIVE MAINTENANCE / โปรแกรมการตรวจเช็ค

☒ 1 ครั้ง/ปี Time/Year ☐ 2 ครั้ง/ปี Time/Year ☐ 3 ครั้ง/ปี Time/Year ☐ 4 ครั้ง/ปี Time/Year
1st Check _____ 2nd Check _____ 3rd Check _____ 4th Check _____

ชื่อลูกค้า

Client's Name _____ CE LAB & CONSULTING CO.,LTD Job No. S67-051

สถานที่ติดตั้ง

Location _____ จ.นครราชสีมา _____ ห้อง room Laboratory 2 _____ ชั้น Floor 2 _____

ขนาดตู้ดูดควัน

Fume Hood size ☒ 1200 mm. ☒ 1500 mm. ☐ 1800 mm. ☐ 2000 mm.

Fume Hood Model

FH45-15

Serial Number

Fume Hood 2

ตัวตู้ดูดควัน/โครงสร้างภายนอก

Fume hood checklists

- ☒ ไม่มีรอยขีดข่วนที่ใหญ่ สังเกตได้ชัด
No major damage or scratch on the hood
- ☒ ไม่มีการแตกร้าวของตัวตู้
No crack on the hood
- ☒ ไม่มีคราบสกปรกต่างๆ ที่ไม่สามารถเช็ดออกได้ง่าย
No stain on the hood
- ☒ หน้าบาน (กระจก/ลูกรอก/สลิง) สามารถใช้งานได้ปกติ
Panels (windows/pulley/sling) are fully function
- ☒ สันคำตรงสเปก ถูกต้องตามรุ่น
Fume hood is corrected according to the specification

ระบบคอนโทรล/ไฟฟ้า/มอเตอร์/พัดลม

Control panel/Electrical system/Motor/Fans checklists

- ☒ ไฟแสดงสถานะต่างๆ ติดเป็นปกติ
All light indicators are fully glow
- ☒ สวิตช์ต่างๆ เปิดใช้งานได้เป็นปกติ
All switches are fully functional
- ☒ ระบบไฟฟ้าแสงสว่างใช้งานได้ปกติ
All lighting is fully functional
- ☒ ปุ่ม Option เสร็มอื่นๆ ใช้งานได้ตามคำสั่ง
All switches and bottoms are fully functional
- ☒ ปลั๊กไฟใช้งานได้ปกติ
All power plug are fully functional
- ☒ มอเตอร์ใช้งานได้ตามปกติ
Motor is fully functional
- ☒ พัดลมใช้งานได้ตามปกติ
Fan system is fully functional

ระบบน้ำ/ระบบแก๊ส

Gas/water system checklist

- ☒ ท่อน้ำใช้งานได้ตามปกติ
Water tap is fully functional
- ☒ ท่อแก๊สใช้งานได้ตามปกติ
Gas tap is fully functional
- ☒ ระบบการทำงานของท่อน้ำ/น้ำทิ้ง ทำงานได้ตามปกติ
Cold water/drain pipe are fully functional

อุปกรณ์เสริม (ถ้ามี)

Additional Accessories (Check if included)

- ☒ ลมเป่าหน้าต่างใช้งานได้ตามปกติ
Auxiliary air is fully functional
- ☒ ระบบชุดดักไอสารเคมีใช้งานได้ตามปกติ
Fume scrubber is fully functional
- ☐ สเปรย์น้ำ/water spray ☐ ฟิลเตอร์/Filters

ชุดดักไอสารเคมี (ถ้ามี)

Fume Scrubber (Check if included)

- ☒ โครงสร้างทั่วไปปกติ
Overall structure is not damaged
- ☒ ระบบการทำงานของเครื่องเป็นปกติ
System is fully functional
- ☒ ระบบควบคุมทำงานได้ตามปกติ
Control system is fully functional
- ☒ มอเตอร์ปั๊มน้ำทำงานได้ตามปกติ
Water pump motor is fully functional
- ☒ ลูกลอยควบคุมมอเตอร์ทำงานปกติ
Floating valve fully controls motor is fully functional
- ☒ ลูกลอยควบคุมตัวเติมน้ำทำงานปกติ
Floating valve kit is fully functional
- ☒ วาล์วน้ำดื่มใช้งานได้ตามปกติ
Cold water valve is fully functional
- ☒ วาล์วน้ำทิ้งใช้งานได้ตามปกติ
Wasted valve is fully functional
- ☒ หัวสเปรย์น้ำใช้งานได้ตามปกติ
Water spray is fully functional
- ☒ ไม่มีน้ำรั่ว
No water Leakage

ผลการตรวจวัด/Test Report

ความเร็วลม/Velocity	ผ่าน/Yes	ไม่ผ่าน/No
เปิด 30 cm ค่าที่วัดได้ _____ 147 ft/min	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sash open at 30 cm. _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>
เปิด 50 cm ค่าที่วัดได้ _____ - ft/min	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sash open at 50 cm. _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>
เปิด 60 cm ค่าที่วัดได้ _____ - ft/min	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sash open at 60 cm. _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>
ค่าความเร็วลมเฉลี่ย _____ 147 ft/min	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Average >100 ft/min _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>

แสงสว่างและเสียง (ONLY PREVENTIVE MAINTENANCE)

แสงสว่าง ความมืด _____ Lux	<input checked="" type="checkbox"/>	<input type="checkbox"/>
ค่าที่วัดได้ >400 Lux _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>
เสียง ค่าที่วัดได้ _____ dB (A)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
ค่าที่วัดได้ <85 dB (A) _____	<input checked="" type="checkbox"/>	<input type="checkbox"/>

อื่นๆ/ข้อเสนอแนะ/Other Suggestions

Hotline Service 0-2431-6061-6



S.K. POWERABLE CO.,LTD.

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F-SA-18-01

08 / 07 / 2024

Checker / ผู้ตรวจสอบ

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : CE-LAB & CONSULTING COMPANY LIMITED.

วันที่ : 31 สิงหาคม 2566

รายชื่ออุปกรณ์ / เครื่องมือ : SO₂ Analyzer

บริษัทผู้ผลิต : Teledyne API

รุ่นของอุปกรณ์ / เครื่องมือ : T100

หมายเลขอุปกรณ์ / เครื่องมือ : 2961

TEST VALUES			
API MODEL T100			
		BEFORE	AFTER
1	RANGE 50 - 20,000 PPB	500.0	500.0
2	SO ₂ STABILITY ≤ 1 PPB	0.106	0.118
3	PRESSURE 25 - 35 in - Hg-A	26.6	27.5
4	SAMPLE FLOW 700 ± 10% cc/min	768	664
5	PMT mV	230.6	20.3
6	NORM PMT mV	254.1	22.4
7	UV LAMP 1000 - 4800 mV	3157.0	3498.3
8	LAMP RATIO 30 To 120 %	96.7	99.4
9	STRAY LIGHT ≤ 100 PPB	14.331	9.878
10	DARK PMT -50 ± 200 % mV	69.3	57.0
11	DARK LAMP -50 ± 200 % mV	2.0	1.6
12	SO ₂ SLOPE 1.0 ± 0.3	1.015	0.962
13	SO ₂ OFFSET < 250 mV	28.2	20.5
14	HVPS 400 - 900 V	554	554
15	RX CELL TEMP 50 ± 1 °C	50.0	50.0
16	BOX TEMP AMBIENT ± 5 °C	36.4	33.4
17	PMT TEMP 7 ± 2 °C	8.6	8.5
18	SO ₂ SAMPLE READING PPB	114.780	0.882
19	OPTIC TEST 2000 ± 1000 mV	590.5	2000.9
20	ELECTRICAL TEST 2000 ± 1000 mV	1137.8	2018.2
21	VOLTAGE TEST +5 V +12 V +15 V -15 V	5.52/12.65/15.56/-15.65	5.52/12.65/15.56/-15.65
22	ZERO GAS 0.00 PPB	81.336	0.538
23	SPAN GAS 400.00 PPB	356.443	400.321

หมายเหตุ

- ตรวจพบ เครื่องมีค่า Reading ที่สูง ตรวจพบต่อมภาพว่า เลนส์ CD, Filter 330 nm, มีคราบสกปรก และ เลนส์ REPLCMNT 214 NM เสีย (เลนส์มีแสงผ่านได้) ส่งผลให้ค่า Reading และค่า PMT ที่สูง
- ทำการเปลี่ยน เลนส์ REPLCMNT 214 NM (เลนส์กระจก) และ ทำความสะอาด เลนส์ CD, Filter 330 nm. ให้กับเครื่อง
- จากการทดสอบการลองใช้งานเครื่อง เครื่องสามารถทำงานปกติและมีค่าอยู่เกณฑ์มาตรฐาน.



(คุณสัณห์จุฑา พัฒนภิรมย์กุล)

ลงนามเจ้าหน้าที่ (Signature)

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิค กรุณาติดต่อ : คุณพรชัย ผาติวนารักษ์

โทรศัพท์ : 0-2515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทระเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : Info@kinetics.co.th

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : CE-LAB & CONSULTING COMPANY LIMITED.

EQUIPMENT NAME : SO₂ Analyzer

MANUFACTURER : Teledyne - API

MODEL : T100

SERIAL NUMBER : 2961

STANDARD GAS CONCENTRATION (PPM) : 53.79

CYLINDER NO : CC745169

CYLINDER PRESSURE (PSIG) : 1250

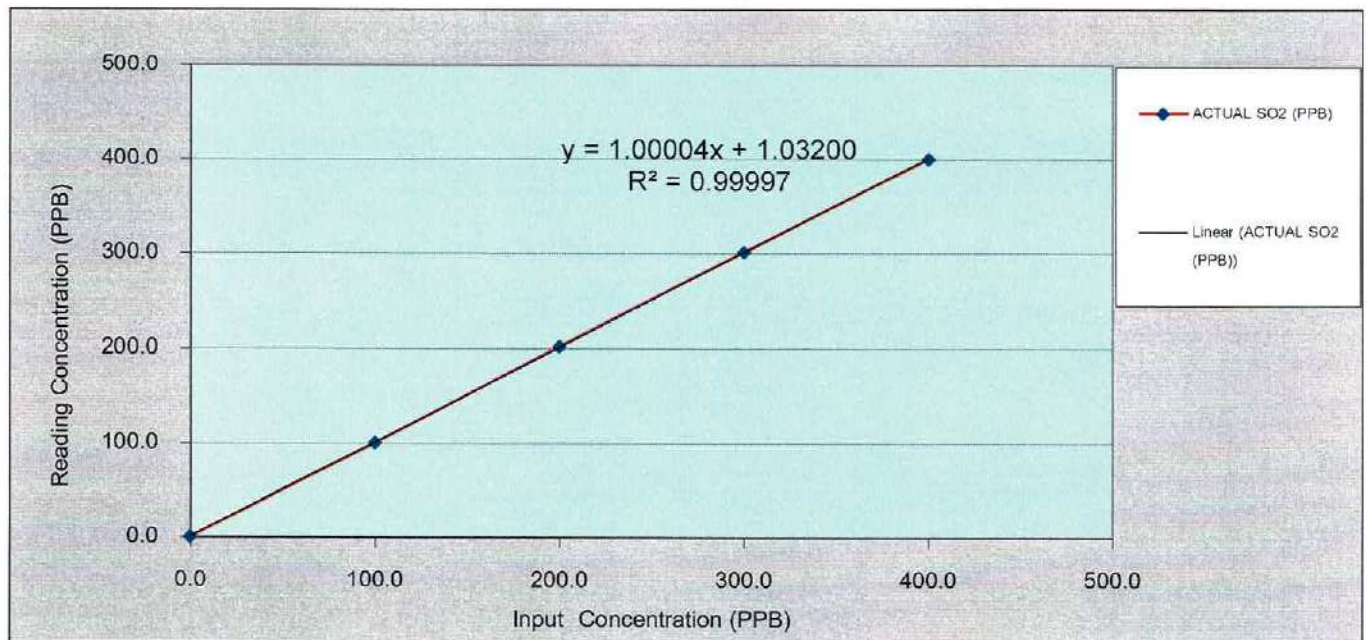
CERTIFIED DATE : Mar 10, 2021

CERTIFIED BY : AIRGAS SPECIALTY GASES

EXPIRED DATE : Mar 10, 2029

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	IDEAL (PPB)	ACTUAL SO ₂ (PPB)	ERROR SO ₂ (PPB)	% ERROR SO ₂
ZERO	0.000	0.54	0.54	-
1	100.00	100.76	0.76	0.76
2	200.00	202.35	2.35	1.17
3	300.00	301.24	1.24	0.41
4	400.00	400.32	0.32	0.08
AVERAGE (%)				0.6



Signature

CALIBRATED BY : คุณสันทัด จุฑา พัฒนภิรมย์กุล

DATE : 31 สิงหาคม 2566

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : คุณพรชัย ผาติวนารักษ์ โทรศัพท์ : 02-515-8987

Customer service report

บริษัท ซีอี แล็บแอนด์คอนเซาท์ติ้ง จำกัด

Manufacturer

Teledyne API

Equipment

SO2 Analyzer

Model

T100

S/N

2961

Quotation

Q-B2-2023-187-SV

● Checking Date ●

30/08/2023

● Problem

- ตรวจเช็คเครื่องพบค่า Reading และ ค่า PMT สูง เนื่องจากเลนส์ CD, Filter 330 nm. มีคราบสกปรก และ เลนส์ 214 nm. เสื่อมสภาพ ส่งผลให้ไม่สามารถทำการ Calibrate ZERO และ SPAN ได้
- ทำการทดสอบนำ เลนส์ 214 nm. ของทางบริษัทมาทดสอบ เครื่องสามารถ Calibrate ZERO และ SPAN ได้ และ มีค่า PMT ที่อยู่ในเกณฑ์มาตรฐาน



CD, Filter 330 nm.



เลนส์ 214 nm.

B2



contact us

● Correlation working / Remark

1. เปลี่ยน เลนส์ 214 nm. (เลนส์กระจก)
2. ทำความสะอาด เลนส์ CD, Filter 330 nm.
3. จากการทดสอบใช้งานเครื่อง *เครื่องสามารถทำงานปกติและมีค่าอยู่เกณฑ์มาตรฐาน

● Repair parts ●

AKIT, REPLCMNT(3187)214NM FLTR (BF) / PN : KIT000093 1 ชิ้น

Technician / Engineer



Sanjutha

Mr. Sanjutha

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E04NI99E15A0622 Reference Number: 160-402045691-1
Cylinder Number: CC745169 Cylinder Volume: 144.4 CF
Laboratory: 124 - Plumsteadville - PA Cylinder Pressure: 2015 PSIG
PGVP Number: A12021 Valve Outlet: 660
Gas Code: CO,NO,NOX,SO2,BALN Certification Date: Mar 10, 2021

Expiration Date: Mar 10, 2029

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
NITRIC OXIDE	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
SULFUR DIOXIDE	53.00 PPM	53.79 PPM	G1	+/- 0.9% NIST Traceable	03/03/2021, 03/10/2021
CARBON MONOXIDE	4500 PPM	4512 PPM	G1	+/- 0.6% NIST Traceable	03/03/2021, 03/10/2021
NITROGEN	Balance				03/04/2021

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	07060227	EB0079116	100.3 PPM NITRIC OXIDE/NITROGEN	+/- 1.0%	Jul 23, 2023
PRM	12386	D685025	9.91 PPM AIR/NITROGEN DIOXIDE	2.0%	Feb 20, 2020
GMIS	124206889	CC323707	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1%	Aug 15, 2021
NTRM	16010203	KAL003087	97.69 PPM SULFUR DIOXIDE/NITROGEN	+/-0.8%	Dec 23, 2021
NTRM	08012341	KAL004716	4857 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jun 07, 2024

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS ULTRAMAT 6 N1KD579	NDIR	Feb 26, 2021
Nicolet IS50 FTIR AUP2010245 NO	FTIR	Feb 11, 2021
Nicolet IS50 FTIR AUP2010245 NO2	FTIR	Feb 22, 2021
Nicolet IS50 FTIR AUP2010245 SO2	FTIR	Feb 18, 2021

Triad Data Available Upon Request

NOTES:

Gross Weight: 28.1 Kg

Net Weight: 4.6 Kg



[Signature]
Approved for Release

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : CE-LAB & CONSULTING COMPANY LIMITED.

วันที่ : 31 สิงหาคม 2566

รายชื่ออุปกรณ์ / เครื่องมือ : NO_x Analyzer

บริษัทผู้ผลิต : Teledyne API

รุ่นของอุปกรณ์ / เครื่องมือ : T200

หมายเลขอุปกรณ์ / เครื่องมือ : 3511

TEST VALUES			
API MODEL T200			
		BEFORE	AFTER
1	RANGE 50 - 20,000 PPB	500.0	500.0
2	STABILITY ≤ 1 PPB	0.8	0.1
3	SAMPLE FLOW 500 ± 10% cc/min	478	483
4	OZONE FLOW 80 ± 10% cc/min	98	80
5	PMT mV	159.7	38.4
6	NORM PMT mV	168.9	39.8
7	A ZERO -20 To 150 MV	169.3	41.8
8	HPVS 400 - 900 V	722	718
9	RX CELL TEMP 50 ± 1 °C	50.0	50.0
10	BOX TEMP AMBIENT ± 5 °C	34.5	34.9
11	PMT TEMP 7 ± 2 °C	7.1	7.1
12	MOLY TEMP 315 ± 5 °C	316.8	316.8
13	RX CELL PRESSURE <10 in - Hg-A	9.3	7.0
14	SAMPLE PRESSURE 25 - 35 in - Hg-A	28.9	28.9
15	NOX SLOPE 1.0 ± 0.3	0.980	0.976
16	NOX OFFSET -50 To 150	0.7	-0.2
17	NO SLOPE 1.0 ± 0.3	0.967	0.967
18	NO OFFSET -50 To 150	0.7	-2.7
19	NO SAMPLE READING PPB	3.5	0.9
20	NO2 SAMPLE READING PPB	15.8	10.3
21	NOX SAMPLE READING PPB	19.2	11.3
22	OPTIC TEST 2000 ± 1000 mV	3058.0	3000.1
23	ELECTRICAL TEST 2000 ± 1000 mV	2869.0	2869.1
24	VOLTAGE TEST +5 V +12 V +15 V -15 V	5.23/12.56/15.35/-15.45	5.23/12.56/15.35/-15.45
25	ZERO GAS NO/NO _x 0.00/0.00 PPB	-1.1/ -0.8	0.2 /0.3
26	SPAN GAS NO/NO _x 400.00/400.00 PPB	453.5/ 453.5	400.7/ 401.9

หมายเหตุ

- ทำการ calibrate Analyzer (Zero/Span) ให้อยู่ในค่ามาตรฐาน
- จากการทดสอบการใช้งานเครื่อง *เครื่องสามารถทำงานปกติและมีค่าอยู่เกณฑ์มาตรฐาน.



(คุณสันทิษฐา พัฒนภิรมย์กุล)

ลงนามเจ้าหน้าที่ (Signature)

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : CE-LAB & CONSULTING COMPANY LIMITED.

EQUIPMENT NAME : NO_x Analyzer

MANUFACTURER : Teledyne - API

MODEL : T200

SERIAL NO : 3511

STANDARD GAS CONCENTRATION (PPM) : 53.40

CYLINDER NO : CC745169

CYLINDER PRESSURE (psig) : 1250

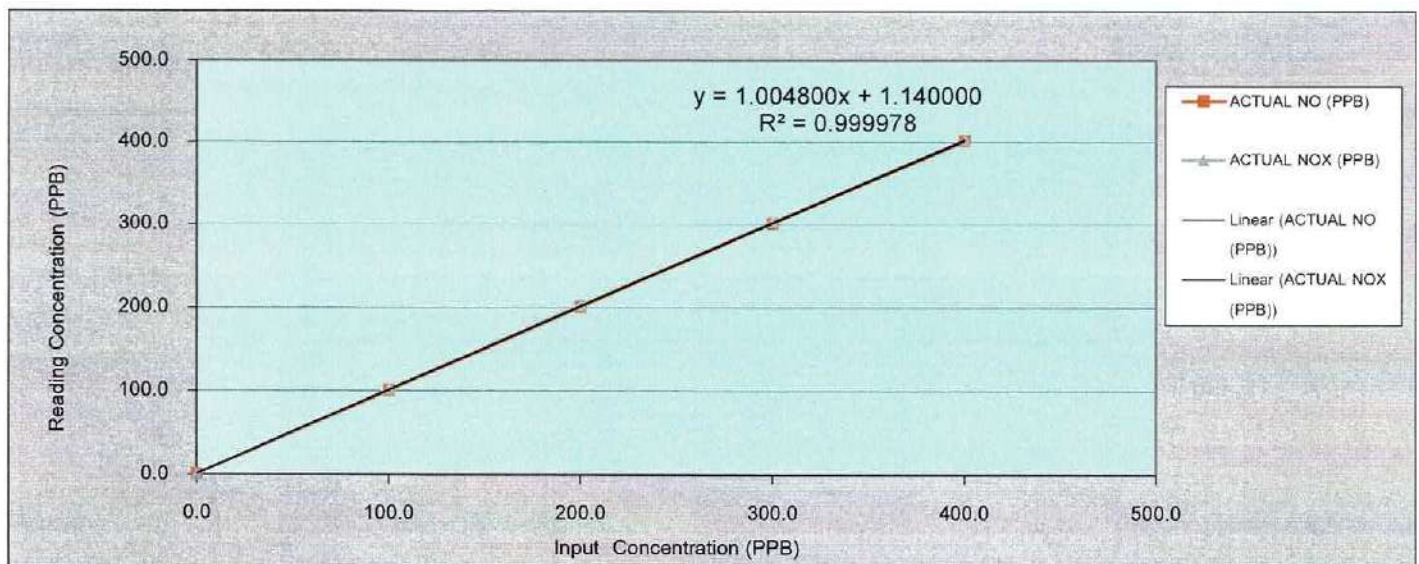
CERTIFIED DATE : Mar 10, 2021

CERTIFIED BY : AIRGAS SPECIALTY GASES

EXPIRED DATE : Mar 10, 2029

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS						
	IDEAL (PPB)	ACTUAL NO (PPB)	ERROR NO (PPB)	% ERROR NO	ACTUAL NO _x (PPB)	ERROR NO _x (PPB)	% ERROR NO _x
ZERO	0.0	0.2	0.2	-	0.3	0.3	-
1	100.0	100.8	0.8	0.8	102.1	2.1	2.1
2	200.0	200.4	-0.7	0.2	202.9	2.9	1.5
3	300.0	301.4	1.4	0.5	302.9	2.9	1.0
4	400.0	400.8	0.8	0.2	402.3	2.3	0.6
AVERAGE (%)				0.4			1.3



CALIBRATED BY : คุณสันทัด วัฒนภิรมย์กุล

DATE : 31 สิงหาคม 2566

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : คุณพรชัย ผาติวนารักษ์ โทรศัพท์ : 02-515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทระเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : Info@kinetics.co.th

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E04NI99E15A0622
Cylinder Number: CC745169
Laboratory: 124 - Plumsteadville - PA
PGVP Number: A12021
Gas Code: CO,NO,NOX,SO2,BALN

Reference Number: 160-402045691-1
Cylinder Volume: 144.4 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 660
Certification Date: Mar 10, 2021

Expiration Date: Mar 10, 2029

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
NITRIC OXIDE	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
SULFUR DIOXIDE	53.00 PPM	53.79 PPM	G1	+/- 0.9% NIST Traceable	03/03/2021, 03/10/2021
CARBON MONOXIDE	4500 PPM	4512 PPM	G1	+/- 0.6% NIST Traceable	03/03/2021, 03/10/2021
NITROGEN	Balance				03/04/2021

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	07060227	EB0079116	100.3 PPM NITRIC OXIDE/NITROGEN	+/- 1.0%	Jul 23, 2023
PRM	12386	D685025	9.91 PPM AIR/NITROGEN DIOXIDE	2.0%	Feb 20, 2020
GMIS	124206889	CC323707	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1%	Aug 15, 2021
NTRM	16010203	KAL003087	97.69 PPM SULFUR DIOXIDE/NITROGEN	+/-0.8%	Dec 23, 2021
NTRM	08012341	KAL004716	4857 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jun 07, 2024

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS ULTRAMAT 6 N1KD579	NDIR	Feb 26, 2021
Nicolet iS50 FTIR AUP2010245 NO	FTIR	Feb 11, 2021
Nicolet iS50 FTIR AUP2010245 NO2	FTIR	Feb 22, 2021
Nicolet iS50 FTIR AUP2010245 SO2	FTIR	Feb 18, 2021

Triad Data Available Upon Request

NOTES:

Gross Weight: 28.1 Kg
Net Weight: 4.6 Kg



[Signature]
Approved for Release



RECALIBRATION

DUE DATE:

July 6, 2021

Certificate of Calibration

Calibration Certification Information

Cal. Date: July 6, 2020

Rootsmeter S/N: 438320

Ta: 297

°K

Operator: Jim Tisch

Pa: 749.8

mm Hg

Calibration Model #: TE-5025A

Calibrator S/N: 3294

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4320	3.2	2.00
2	3	4	1	1.0190	6.4	4.00
3	5	6	1	0.9070	8.0	5.00
4	7	8	1	0.8710	8.8	5.50
5	9	10	1	0.7170	12.8	8.00

Data Tabulation

Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)}$ (y-axis)
0.9857	0.6883	1.4071	0.9957	0.6953	0.8901
0.9815	0.9632	1.9899	0.9915	0.9730	1.2587
0.9793	1.0798	2.2248	0.9893	1.0908	1.4073
0.9783	1.1232	2.3333	0.9883	1.1346	1.4760
0.9730	1.3571	2.8141	0.9829	1.3709	1.7801
QSTD	m=	2.10547	QA	m=	1.31841
	b=	-0.04070		b=	-0.02574
	r=	0.99992		r=	0.99992

Calculations

Vstd=	$\Delta Vol((Pa-\Delta P)/Pstd)(Tstd/Ta)$	Va=	$\Delta Vol((Pa-\Delta P)/Pa)$
Qstd=	Vstd/ΔTime	Qa=	Va/ΔTime
For subsequent flow rate calculations:			
Qstd=	$1/m \left(\left(\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)} \right) - b \right)$	Qa=	$1/m \left(\left(\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)} \right) - b \right)$

Standard Conditions

Tstd: 298.15 °K

Pstd: 760 mm Hg

Key

ΔH: calibrator manometer reading (in H2O)

ΔP: rootsmeter manometer reading (mm Hg)

Ta: actual absolute temperature (°K)

Pa: actual barometric pressure (mm Hg)

b: intercept

m: slope

RECALIBRATION

US EPA recommends annual recalibration per 1998 40 Code of Federal Regulations Part 50 to 51, Appendix B to Part 50, Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere, 9.2.17, page 30



MICRO PRECISION CALIBRATION LABORATORY (THAILAND) CO., LTD.
413 BONDSTREET ROAD, TAMBOL BANGPOODAMPHOE PAKKRED, NONTHABURI
NONTHABURI 11120 THAILAND
66 2 583 9834



Certificate of Calibration

Date: Oct 4, 2023

Cert No. 5523631030389079

Customer:

C E LAB & CONSULTING CO.LTD

245 M.4 T.NONGSAI

A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9581

Asset ID: BU.25

Gage Type: BURETTE

Manufacturer: GLASSCO

Model Number: N/A

Size: 25 ml

Temp/RH: 20.5°C / 55.0%

Location: Calibration performed at MPC facility

Serial Number: N/A

Department: N/A

Performed By: WATTANA TANGCHAROEN

Received Condition: IN TOLERANCE

Returned Condition: IN TOLERANCE

Cal. Date: October 03, 2023

Cal. Interval: 12 MONTHS

Cal. Due Date: October 03, 2024

Calibration Notes:

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AZ5418	PORTABLE ELECTRONIC BALANCE	WXSS205DU	1123373105	METTLER TOLEDO	May 16, 2024	552363103005903
AS9541	PLATINUM RESISTANCE THERMOMETER	162C	957	ROSEMOUNT ANALYTICAL INC	Jun 19, 2026	7 / MP-TH TT-0078-23 / NIMT

Procedures Used in this Event

Procedure Name

ASTM E 542-01

Description

Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:

WATTANA TANGCHAROEN

QC Approval:

PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS - Term used when compliance statement is given, and the measurement result is PASS.

PASS² - Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL - Term used when compliance statement is given, and the measurement result is FAIL.

FAIL² - Term used when compliance statement is given, and the measurement result is conditional failed or FAIL².

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED - When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017, ANSI/NCSL Z540.3-2006 and ANSI/NCSL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified; this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Glassco Burette

MPC Control #:	EA9581	Serial Number:	N/A
Asset ID:	BU.25	Calibration Date:	October 3, 2023

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
1	0.9500	0.9933	0.9933	1.0500	PASS	± 0.0015
13	12.9500	12.9972	12.9972	13.0500	PASS	± 0.0017
25	24.9500	24.9922	24.9922	25.0500	PASS	± 0.0031

Note: Accuracy ± 0.05 ml

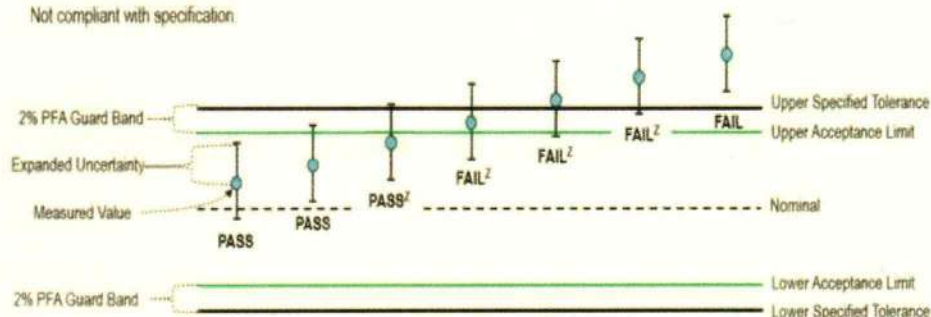
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification.
- PASS^z** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^z** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification.



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

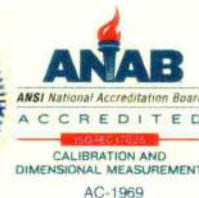
The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCSL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio.

End of Calibration Report



MICRO PRECISION CALIBRATION LABORATORY (THAILAND) CO., LTD.
413 BONDSTREET ROAD, TAMBOL BANGPOODAMPHOE PAKKRED, NONTHABURI
NONTABURI 11120 THAILAND
66 2 583 9834



Certificate of Calibration

Date: Oct 4, 2023

Cert No. 5523631030389084

Customer:

C E LAB & CONSULTING CO.LTD

245 M.4 T.NONGSAI

A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9583

Asset ID: BU.50

Gage Type: BURETTE

Manufacturer: GLASSCO

Model Number: N/A

Size: 50 ml

Temp/RH: 20.5°C / 55.0%

Location: Calibration performed at MPC facility

Serial Number: N/A

Department: N/A

Performed By: WATTANA TANGCHAROEN

Received Condition: IN TOLERANCE

Returned Condition: IN TOLERANCE

Cal. Date: October 03, 2023

Cal. Interval: 12 MONTHS

Cal. Due Date: October 03, 2024

Calibration Notes:

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AZ5418	PORTABLE ELECTRONIC BALANCE	WXSS205DU	1123373105	METTLER TOLEDO	May 16, 2024	552363103005903 7 / MP-TH
AS9541	PLATINUM RESISTANCE THERMOMETER	162C	957	ROSEMOUNT ANALYTICAL INC	Jun 19, 2026	TT-0078-23 / NIMT

Procedures Used in this Event

Procedure Name

Description

ASTM E 542-01

Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:

WATTANA TANGCHAROEN

QC Approval:

PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006

THE CALIBRATION REPORT STATUS:

PASS - Term used when compliance statement is given, and the measurement result is PASS.

PASS² - Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL - Term used when compliance statement is given, and the measurement result is FAIL.

FAIL² - Term used when compliance statement is given, and the measurement result is conditional failed or FAIL².

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED - When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017, ANSI/NCCL Z540.3-2006 and ANSI/NCCL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Glassco Burette

MPC Control #: EA9583
Asset ID: BU.50

Serial Number: N/A
Calibration Date: October 3, 2023

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
1	0.9500	0.9929	0.9929	1.0500	PASS	± 0.0015
25	24.9500	24.9863	24.9863	25.0500	PASS	± 0.0031
50	49.9500	49.9809	49.9809	50.0500	PASS	± 0.0060

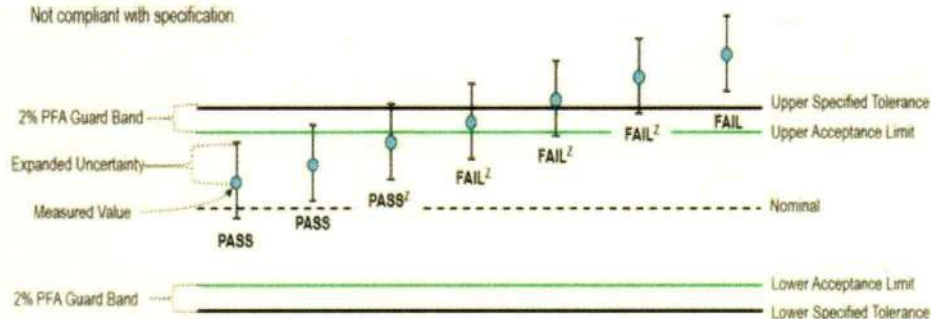
Note: Accuracy ± 0.05 ml

Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.
All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification.
- PASS²** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL²** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification.



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCSL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio.

End of Calibration Report

Certificate of Calibration

Date: Sep 29, 2023

Cert No. 5523631030379112

Customer:C E LAB & CONSULTING CO.LTD
245 M.4 T.NONGSAI
A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9568
Asset ID: GC.10
Gage Type: GRADUATED CYLINDER
Manufacturer: GLASSCO
Model Number: N/A
Size: 10 ml
Temp/RH: 20.4°C / 55.0%
Location: Calibration performed at MPC facilitySerial Number: N/A
Department: N/A
Performed By: WIKRAI SUCHAISONG
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: September 27, 2023
Cal. Interval: 12 MONTHS
Cal. Due Date: September 27, 2024**Calibration Notes:**

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AZ5418	PORTABLE ELECTRONIC BALANCE	WXSS205DU	1123373105	METTLER TOLEDO	May 16, 2024	552363103005903 7 / MP-TH

Procedures Used in this Event

Procedure Name	Description
ASTM E 542-01	Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:

WIKRAI SUCHAISONG

QC Approval:

PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS: Term used when compliance statement is given, and the measurement result is PASS.

PASS²: Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL: Term used when compliance statement is given, and the measurement result is FAIL.

FAIL²: Term used when compliance statement is given, and the measurement result is conditional failed or FAIL².

REPORT OF VALUE: Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED: When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED: When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017, ANSI/NCCL Z540.3-2006 and ANSI/NCCL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST).

and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified; this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Glassco Graduated Cylinder

MPC Control #:	EA9568	Serial Number:	N/A
Asset ID:	GC.10	Calibration Date:	September 27, 2023

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
2	1.900	1.938	1.938	2.100	PASS	± 0.0015
4	3.900	3.911	3.911	4.100	PASS	± 0.0015
6	5.900	5.946	5.946	6.100	PASS	± 0.0015
8	7.900	7.950	7.950	8.100	PASS	± 0.0015
10	9.900	9.935	9.935	10.100	PASS	± 0.0015

Note: Accuracy ± 0.10 ml.

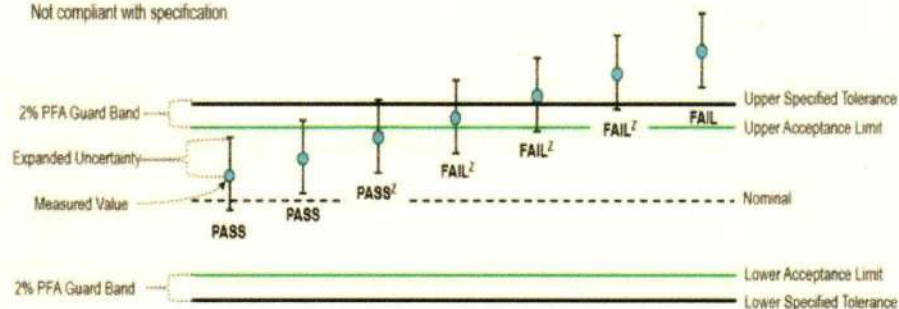
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification.
- PASS^z** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^z** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification.



Acceptance limits for ≤ 2% probability of false accept (PFA) guard band

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCCL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio

End of Calibration Report

Certificate of Calibration

Date: Sep 29, 2023

Cert No. 5523631030379116

Customer:

C E LAB & CONSULTING CO.LTD
245 M.4 T.NONGSAI
A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9569
Asset ID: GC.50
Gage Type: GRADUATED CYLINDER
Manufacturer: GLASSCO
Model Number: N/A
Size: 50 ml
Temp/RH: 20.4°C / 55.0%
Location: Calibration performed at MPC facilitySerial Number: N/A
Department: N/A
Performed By: WIKRAI SUCHAISONG
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: September 27, 2023
Cal. Interval: 12 MONTHS
Cal. Due Date: September 27, 2024

Calibration Notes:

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AZ5418	PORTABLE ELECTRONIC BALANCE	WXSS205DU	1123373105	METTLER TOLEDO	May 16, 2024	552363103005903 7 / MP-TH

Procedures Used in this Event

Procedure Name	Description
ASTM E 542-01	Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:

WIKRAI SUCHAISONG

QC Approval:

PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS- Term used when compliance statement is given, and the measurement result is PASS.

PASS²- Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL- Term used when compliance statement is given, and the measurement result is FAIL.

FAIL²- Term used when compliance statement is given, and the measurement result is conditional failed or FAIL².

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED- When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017, ANSI/NCCL Z540.3-2006 and ANSI/NCCL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Glassco Graduated Cylinder

MPC Control #:	EA9569	Serial Number:	N/A
Asset ID:	GC.50	Calibration Date:	September 27, 2023

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
10	9.500	9.631	9.631	10.500	PASS	± 0.0015
20	19.500	19.670	19.670	20.500	PASS	± 0.0028
30	29.500	29.692	29.692	30.500	PASS	± 0.0036
40	39.500	39.700	39.700	40.500	PASS	± 0.0048
50	49.500	49.751	49.751	50.500	PASS	± 0.0060

Note: Accuracy ± 0.50 ml.

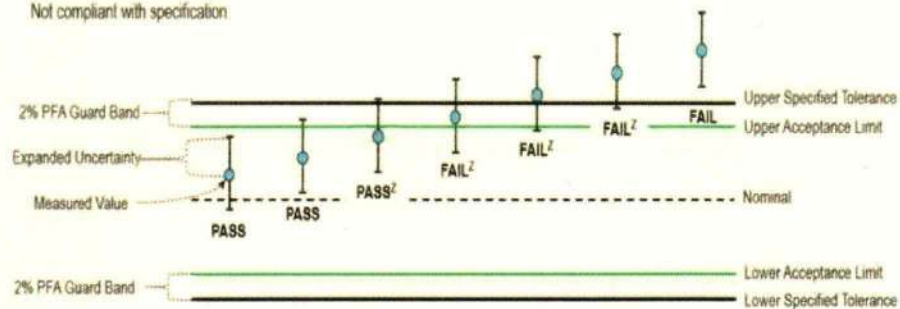
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification.
- PASS^z** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^z** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification.



Acceptance limits for ≤ 2% probability of false accept (PFA) guard band

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCCL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio

End of Calibration Report

Certificate of Calibration

Date: Sep 29, 2023

Cert No. 5523631030379118

Customer:C E LAB & CONSULTING CO.LTD
245 M.4 T.NONGSAI
A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9570
Asset ID: GC.100
Gage Type: GRADUATED CYLINDER
Manufacturer: GLASSCO
Model Number: N/A
Size: 100 ml
Temp/RH: 20.4°C / 55.0%
Location: Calibration performed at MPC facilitySerial Number: N/A
Department: N/A
Performed By: WIKRAI SUCHAISONG
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: September 27, 2023
Cal. Interval: 12 MONTHS
Cal. Due Date: September 27, 2024**Calibration Notes:**

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AZ5418	PORTABLE ELECTRONIC BALANCE	WXSS205DU	1123373105	METTLER TOLEDO	May 16, 2024	552363103005903 7 / MP-TH

Procedures Used in this Event

Procedure Name	Description
ASTM E 542-01	Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:

WIKRAI SUCHAISONG

QC Approval:

PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS- Term used when compliance statement is given, and the measurement result is PASS

PASS²- Term used when compliance statement is given, and the measurement result is conditional passed or PASS²

FAIL- Term used when compliance statement is given, and the measurement result is FAIL

FAIL²- Term used when compliance statement is given, and the measurement result is conditional failed or FAIL²

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED- When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017, ANSI/NCSL Z540.3-2006 and ANSI/NCSL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST).

and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Glassco Graduated Cylinder

MPC Control #:	EA9570	Serial Number:	N/A
Asset ID:	GC.100	Calibration Date:	September 27, 2023

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
10	9.500	10.025	10.025	10.500	PASS	± 0.0015
30	29.000	29.621	29.621	31.000	PASS	± 0.0036
50	49.000	49.679	49.679	51.000	PASS	± 0.0060
70	69.000	69.802	69.802	71.000	PASS	± 0.0085
100	99.000	99.923	99.923	101.000	PASS	± 0.012

Note: Accuracy ± 1 ml.

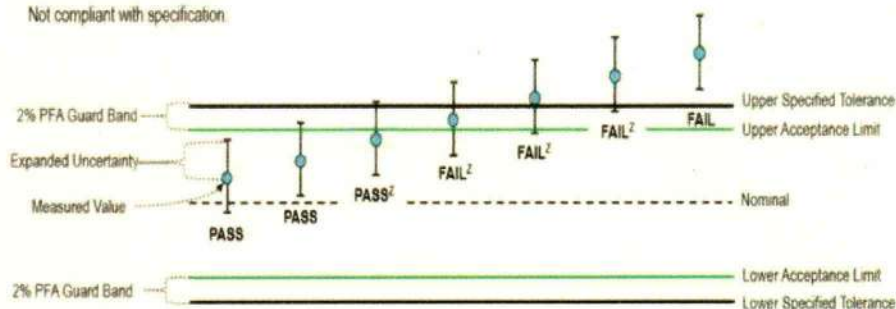
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification.
- PASS^z** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^z** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification.



Acceptance limits for ≤ 2% probability of false accept (PFA) guard band

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCCL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio.

End of Calibration Report

Certificate of Calibration

Date: Sep 29, 2023**Cert No.** 5523631030379122**Customer:**

C E LAB & CONSULTING CO.LTD

245 M.4 T.NONGSAI

A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9571
Asset ID: GC.250
Gage Type: GRADUATED CYLINDER
Manufacturer: SCHOTT DURAN
Model Number: N/A
Size: 250 ml
Temp/RH: 20.4°C / 55.0%
Location: Calibration performed at MPC facility

Serial Number: N/A
Department: N/A
Performed By: WIKRAI SUCHAISONG
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: September 27, 2023
Cal. Interval: 12 MONTHS
Cal. Due Date: September 27, 2024

Calibration Notes:

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
CS7699	ELECTRONIC PRECISION BALANCE	LP 3200D	14805933	SARTORIUS	Feb 3, 2024	551220085652905 / MP-TH

Procedures Used in this Event

Procedure Name	Description
ASTM E 542-01	Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:

WIKRAI SUCHAISONG

QC Approval:

PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS- Term used when compliance statement is given, and the measurement result is PASS.

PASS²- Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL- Term used when compliance statement is given, and the measurement result is FAIL.

FAIL²- Term used when compliance statement is given, and the measurement result is conditional failed or FAIL².

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED- When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017, ANSI/NCSL Z540.3-2006 and ANSI/NCSL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Glassco Graduated Cylinder

MPC Control #: EA9571
Asset ID: GC.250

Serial Number: N/A
Calibration Date: September 27, 2023

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
30	29.000	29.485	29.485	31.000	PASS	± 0.090
90	89.000	89.099	89.099	91.000	PASS	± 0.090
150	149.000	149.328	149.328	151.000	PASS	± 0.018
210	209.000	209.580	209.580	211.000	PASS	± 0.025
250	249.000	249.644	249.644	251.000	PASS	± 0.030

Note: Accuracy ± 1 ml.

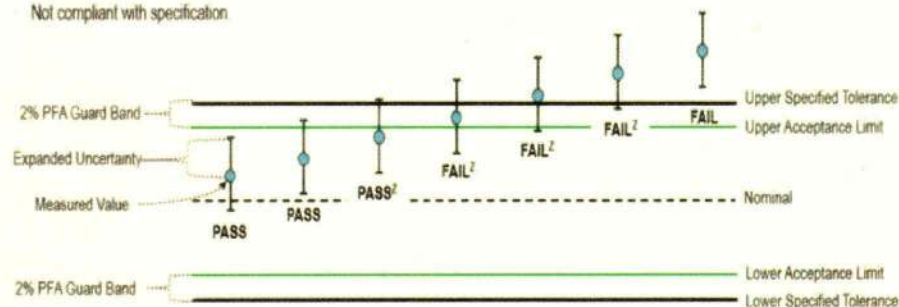
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540 3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification
- PASS^z** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^z** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCSL Z540 3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio.

End of Calibration Report

Certificate of Calibration

Date: Sep 29, 2023

Cert No. 5523631030379126

Customer:C E LAB & CONSULTING CO.LTD
245 M.4 T.NONGSAI
A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9573
Asset ID: GC.500
Gage Type: GRADUATED CYLINDER
Manufacturer: GLASSCO
Model Number: N/A
Size: 500 ml
Temp/RH: 20.4°C / 55.0%
Location: Calibration performed at MPC facilitySerial Number: N/A
Department: N/A
Performed By: WIKRAI SUCHAISONG
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: September 27, 2023
Cal. Interval: 12 MONTHS
Cal. Due Date: September 27, 2024**Calibration Notes:**

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
CS7699	ELECTRONIC PRECISION BALANCE	LP 3200D	14805933	SARTORIUS	Feb 3, 2024	551220085652905 / MP-TH

Procedures Used in this Event

Procedure Name	Description
ASTM E 542-01	Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:

WIKRAI SUCHAISONG

QC Approval:

PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS- Term used when compliance statement is given, and the measurement result is PASS

PASS²- Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL- Term used when compliance statement is given, and the measurement result is FAIL.

FAIL²- Term used when compliance statement is given, and the measurement result is conditional failed or FAIL².

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED- When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017, ANSI/NCSL Z540.3-2006 and ANSI/NCSL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Glassco Graduated Cylinder

MPC Control #:	EA9573	Serial Number:	N/A
Asset ID:	GC.500	Calibration Date:	September 27, 2023

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
50	47.500	50.077	50.077	52.500	PASS	± 0.0060
200	197.500	199.074	199.074	202.500	PASS	± 0.024
300	297.500	298.753	298.753	302.500	PASS	± 0.036
400	397.500	399.064	399.064	402.500	PASS	± 0.048
500	497.500	498.488	498.488	502.500	PASS	± 0.060

Note: Accuracy ± 2.5 ml.

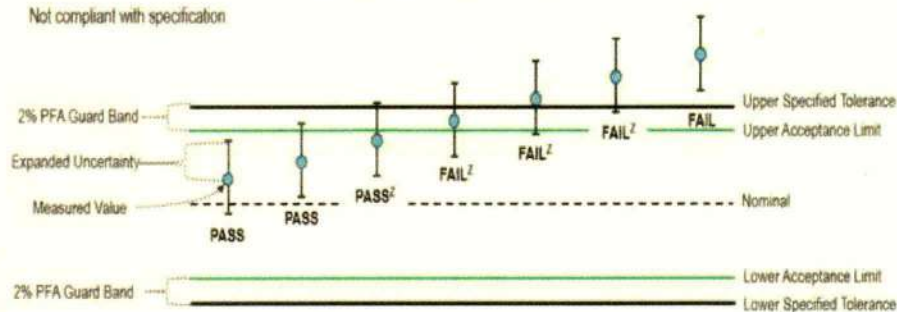
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification
- PASS²** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance
- FAIL²** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance
- FAIL** — Not compliant with specification



Acceptance limits for ≤ 2% probability of false accept (PFA) guard band

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCCL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio

End of Calibration Report

Certificate of Calibration

Date: Sep 29, 2023

Cert No. 5523631030379129

Customer:

C E LAB & CONSULTING CO.LTD

245 M.4 T.NONGSAI

A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9574

Asset ID: GC.1000

Gage Type: GRADUATED CYLINDER

Manufacturer: SCI

Model Number: N/A

Size: 1000 ml

Temp/RH: 20.4°C / 55.0%

Location: Calibration performed at MPC facility

Serial Number: N/A

Department: N/A

Performed By: WIKRAI SUCHAISONG

Received Condition: IN TOLERANCE

Returned Condition: IN TOLERANCE

Cal. Date: September 27, 2023

Cal. Interval: 12 MONTHS

Cal. Due Date: September 27, 2024

Calibration Notes:

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
CS7699	ELECTRONIC PRECISION BALANCE	LP 3200D	14805933	SARTORIUS	Feb 3, 2024	551220085652905 / MP-TH

Procedures Used in this Event

Procedure Name

Description

ASTM E 542-01

Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:

QC Approval:

WIKRAI SUCHAISONG

PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL 2540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS- Term used when compliance statement is given, and the measurement result is PASS

PASS²- Term used when compliance statement is given, and the measurement result is conditional passed or PASS²

FAIL- Term used when compliance statement is given, and the measurement result is FAIL

FAIL²- Term used when compliance statement is given, and the measurement result is conditional failed or FAIL²

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED- When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017, ANSI/NCSL 2540.3-2006 and ANSI/NCSL 2540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST).

and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Glassco Graduated Cylinder

MPC Control #:	EA9574	Serial Number:	N/A
Asset ID:	GC.1000	Calibration Date:	September 27, 2023

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
100	90.00	100.58	100.58	110.00	PASS	± 0.012
300	290.00	300.83	300.83	310.00	PASS	± 0.036
600	590.00	601.69	601.69	610.00	PASS	± 0.072
800	790.00	801.93	801.93	810.00	PASS	± 0.096
1000	990.00	1000.91	1000.91	1010.00	PASS	± 0.12

Note: Accuracy ± 10 ml.

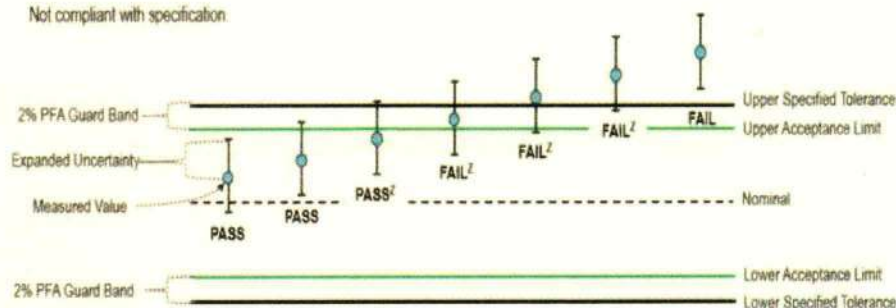
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification.
- PASS²** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL²** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification.



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCSL Z540.3-2006, Method 6 --- Guard Bands Based on Test Uncertainty Ratio

End of Calibration Report

Certificate of Calibration

Date: Oct 4, 2023

Cert No. 5523631030389069

Customer:

C E LAB & CONSULTING CO.LTD

245 M.4 T.NONGSAI

A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9575

Serial Number: N/A

Asset ID: GP.1

Department: N/A

Gage Type: GRADUATED PIPETTE

Performed By: WATTANA TANGCHAROEN

Manufacturer: GLASSCO

Received Condition: IN TOLERANCE

Model Number: N/A

Returned Condition: IN TOLERANCE

Size: 1 ml

Cal. Date: October 03, 2023

Temp/RH: 20.5°C / 55.0%

Cal. Interval: 12 MONTHS

Location: Calibration performed at MPC facility

Cal. Due Date: October 03, 2024

Calibration Notes:

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AZ5418	PORTABLE ELECTRONIC BALANCE	WXSS205DU	1123373105	METTLER TOLEDO	May 16, 2024	552363103005903 7 / MP-TH
AS9541	PLATINUM RESISTANCE THERMOMETER	162C	957	ROSEMOUNT ANALYTICAL INC	Jun 19, 2026	TT-0078-23 / NIMT

Procedures Used in this Event

Procedure Name

Description

ASTM E 542-01

Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:



WATTANA TANGCHAROEN

QC Approval:



PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS: Term used when compliance statement is given, and the measurement result is PASS

PASS²: Term used when compliance statement is given, and the measurement result is conditional passed or PASS²

FAIL: Term used when compliance statement is given, and the measurement result is FAIL

FAIL²: Term used when compliance statement is given, and the measurement result is conditional failed or FAIL²

REPORT OF VALUE: Term used when reported measurement is not requiring compliance statement in report

ADJUSTED: When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left

LIMITED: When an instrument fails calibration but is still functional in a limited manner

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017, ANSI/NCSL Z540.3-2006 and ANSI/NCSL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Glassco Graduated Pipette

MPC Control #:	EA9575	Serial Number:	N/A
Asset ID:	GP.1	Calibration Date:	October 3, 2023

Measurement Results

Nominal Value (μl)	Lower Limit (μl)	Mean Indicated Value of Instrument (μl)		Upper Limit (μl)	Result	Uncertainty (μl)
		As Found	As Left			
100	93.00	100.78	100.78	107.00	PASS	± 0.058
500	493.00	501.99	501.99	507.00	PASS	± 0.087
1000	993.00	1003.58	1003.58	1007.00	PASS	± 0.17

Note: Accuracy ± 0.007 ml.

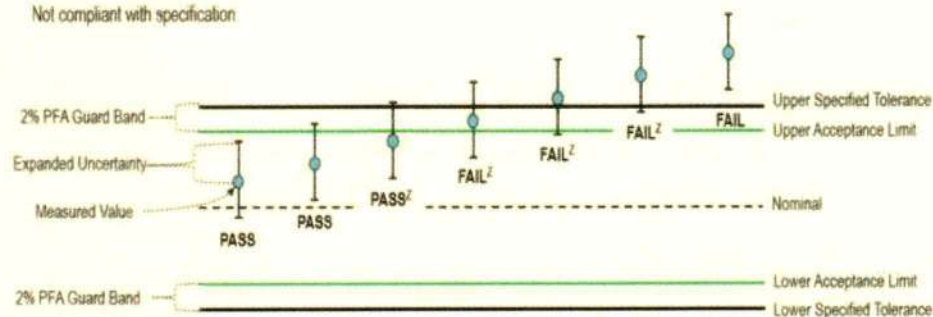
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006.

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification.
- PASS^z** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^z** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification.



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCSL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio.

End of Calibration Report

Certificate of Calibration

Date: Oct 4, 2023

Cert No. 5523631030389071

Customer:

C E LAB & CONSULTING CO.LTD

245 M.4 T.NONGSAI

A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9576

Asset ID: GP.2

Gage Type: GRADUATED PIPETTE

Manufacturer: GLASSCO

Model Number: N/A

Size: 2 ml

Temp/RH: 20.5°C / 55.0%

Location: Calibration performed at MPC facility

Serial Number: N/A

Department: N/A

Performed By: WATTANA TANGCHAROEN

Received Condition: IN TOLERANCE

Returned Condition: IN TOLERANCE

Cal. Date: October 03, 2023

Cal. Interval: 12 MONTHS

Cal. Due Date: October 03, 2024

Calibration Notes:

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AZ5418	PORTABLE ELECTRONIC BALANCE	WXSS205DU	1123373105	METTLER TOLEDO	May 16, 2024	552363103005903 7 / MP-TH
AS9541	PLATINUM RESISTANCE THERMOMETER	162C	957	ROSEMOUNT ANALYTICAL INC	Jun 19, 2026	TT-0078-23 / NIMT

Procedures Used in this Event

Procedure Name

ASTM E 542-01

Description

Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:



WATTANA TANGCHAROEN

QC Approval:



PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS- Term used when compliance statement is given, and the measurement result is PASS.

PASS²- Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL- Term used when compliance statement is given, and the measurement result is FAIL.

FAIL²- Term used when compliance statement is given, and the measurement result is conditional failed or FAIL².

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED- When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017, ANSI/NCSL Z540.3-2006 and ANSI/NCSL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Glassco Graduated Pipette

MPC Control #:	EA9576	Serial Number:	N/A
Asset ID:	GP.2	Calibration Date:	October 3, 2023

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
0.2	0.1900	0.1998	0.1998	0.2100	PASS	± 0.000041
1.0	0.9900	1.0034	1.0034	1.0100	PASS	± 0.00017
2.0	1.9900	2.0061	2.0061	2.0100	PASS	± 0.00033

Note: Accuracy ± 0.010 ml.

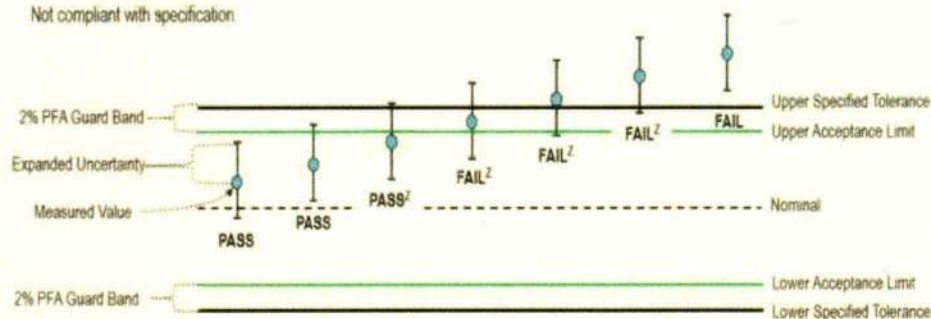
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification.
- PASS^Z** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^Z** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification.



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCSL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio.

End of Calibration Report

Certificate of Calibration

Date: Oct 4, 2023

Cert No. 5523631030389072

Customer:

C E LAB & CONSULTING CO.LTD
245 M.4 T.NONGSAI
A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9577
Asset ID: GP.5
Gage Type: GRADUATED PIPETTE
Manufacturer: GLASSCO
Model Number: N/A
Size: 5 ml
Temp/RH: 20.5°C / 55.0%
Location: Calibration performed at MPC facility

Serial Number: N/A
Department: N/A
Performed By: WATTANA TANGCHAROEN
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: October 03, 2023
Cal. Interval: 12 MONTHS
Cal. Due Date: October 03, 2024

Calibration Notes:

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AZ5418	PORTABLE ELECTRONIC BALANCE	WXSS205DU	1123373105	METTLER TOLEDO	May 16, 2024	552363103005903 7 / MP-TH
AS9541	PLATINUM RESISTANCE THERMOMETER	162C	957	ROSEMOUNT ANALYTICAL INC	Jun 19, 2026	TT-0078-23 / NIMT

Procedures Used in this Event

Procedure Name	Description
ASTM E 542-01	Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:



WATTANA TANGCHAROEN

QC Approval:



PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS - Term used when compliance statement is given, and the measurement result is PASS.

PASS² - Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL - Term used when compliance statement is given, and the measurement result is FAIL.

FAIL² - Term used when compliance statement is given, and the measurement result is conditional failed or FAIL².

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED - When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017, ANSI/NCSL Z540.3-2006 and ANSI/NCSL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Glassco Graduated Pipette

MPC Control #:	EA9577	Serial Number:	N/A
Asset ID:	GP.5	Calibration Date:	October 3, 2022

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
0.5	0.4700	0.5013	0.5013	0.5300	PASS	± 0.000087
2.5	2.4700	2.5069	2.5069	2.5300	PASS	± 0.00041
5.0	4.9700	5.0141	5.0141	5.0300	PASS	± 0.00083

Note: Accuracy ± 0.030 ml.

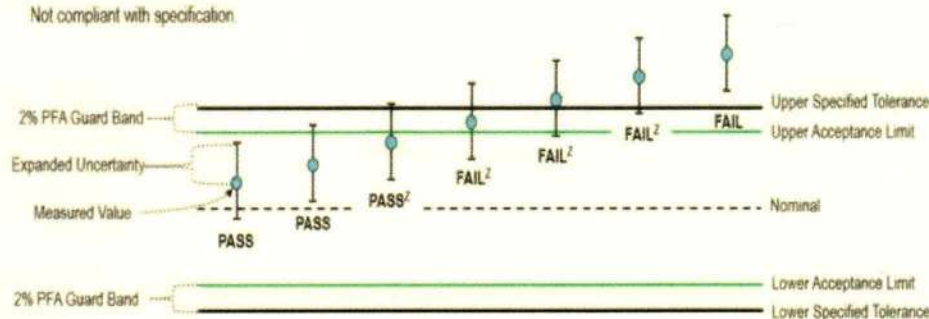
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006.

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification.
- PASS^z** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^z** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification.



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCCL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio.

End of Calibration Report

Certificate of Calibration

Date: Oct 4, 2023

Cert No. 5523631030389074

Customer:

C E LAB & CONSULTING CO.LTD

245 M.4 T.NONGSAI

A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9578

Asset ID: VP.10

Gage Type: VOLUMETRIC PIPETTE

Manufacturer: GLASSCO

Model Number: N/A

Size: 10 ml

Temp/RH: 20.5°C / 55.0%

Location: Calibration performed at MPC facility

Serial Number: N/A

Department: N/A

Performed By: WATTANA TANGCHAROEN

Received Condition: IN TOLERANCE

Returned Condition: IN TOLERANCE

Cal. Date: October 03, 2023

Cal. Interval: 12 MONTHS

Cal. Due Date: October 03, 2024

Calibration Notes:

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AZ5418	PORTABLE ELECTRONIC BALANCE	WXSS205DU	1123373105	METTLER TOLEDO	May 16, 2024	552363103005903 7 / MP-TH
AS9541	PLATINUM RESISTANCE THERMOMETER	162C	957	ROSEMOUNT ANALYTICAL INC	Jun 19, 2026	TT-0078-23 / NIMT

Procedures Used in this Event

Procedure Name

ASTM E 542-01

Description

Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:



WATTANA TANGCHAROEN

QC Approval:



PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS - Term used when compliance statement is given, and the measurement result is PASS.

PASS¹ - Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL - Term used when compliance statement is given, and the measurement result is FAIL.

FAIL² - Term used when compliance statement is given, and the measurement result is conditional failed or FAIL².

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED - When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017, ANSI/NCSL Z540.3-2006 and ANSI/NCSL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Glassco Volumetric Pipette

MPC Control #:	EA9578	Serial Number:	N/A
Asset ID:	VP.10	Calibration Date:	October 3, 2023

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
10	9.9800	9.9947	9.9947	10.0200	PASS	± 0.0015

Note: Accuracy ± 0.02 ml.

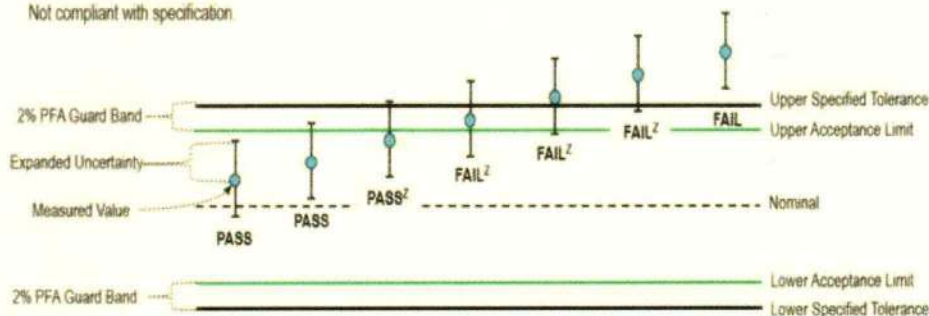
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification.
- PASS^z** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^z** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification.



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCSL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio

End of Calibration Report

Certificate of Calibration

Date: Oct 4, 2023

Cert No. 5523631030389077

Customer:

C E LAB & CONSULTING CO.LTD

245 M.4 T.NONGSAI

A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9579
Asset ID: GP.25
Gage Type: GRADUATED PIPETTE
Manufacturer: GLASSCO
Model Number: N/A
Size: 25 ml
Temp/RH: 20.5°C / 55.0%
Location: Calibration performed at MPC facility

Serial Number: N/A
Department: N/A
Performed By: WATTANA TANGCHAROEN
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: October 03, 2023
Cal. Interval: 12 MONTHS
Cal. Due Date: October 03, 2024

Calibration Notes:

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AZ5418	PORTABLE ELECTRONIC BALANCE	WXSS205DU	1123373105	METTLER TOLEDO	May 16, 2024	552363103005903 7 / MP-TH
AS9541	PLATINUM RESISTANCE THERMOMETER	162C	957	ROSEMOUNT ANALYTICAL INC	Jun 19, 2026	TT-0078-23 / NIMT

Procedures Used in this Event

Procedure Name

ASTM E 542-01

Description

Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:



WATTANA TANGCHAROEN

QC Approval:



PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS - Term used when compliance statement is given, and the measurement result is PASS.

PASS² - Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL - Term used when compliance statement is given, and the measurement result is FAIL.

FAIL² - Term used when compliance statement is given, and the measurement result is conditional failed or FAIL².

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED - When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017, ANSI/NCSL Z540.3-2006 and ANSI/NCSL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Glassco Graduated Pipette

MPC Control #: EA9579
Asset ID: GP.25

Serial Number: N/A
Calibration Date: October 3, 2023

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
1	0.900	1.003	1.003	1.100	PASS	± 0.0015
13	12.900	13.036	13.036	13.100	PASS	± 0.0017
25	24.900	25.069	25.069	25.100	PASS	± 0.0032

Note: Accuracy ± 0.10 ml

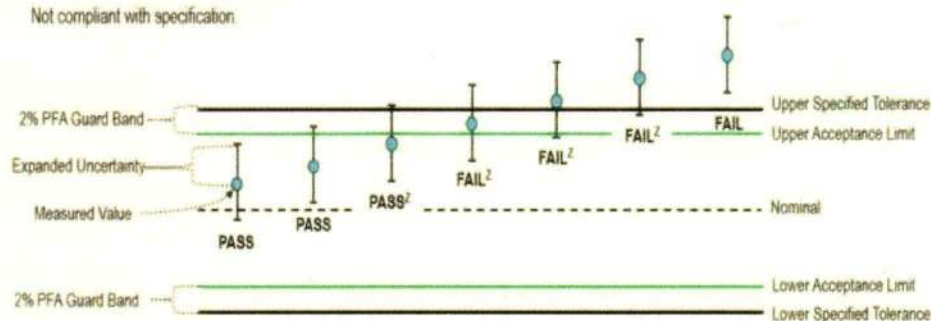
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification.
- PASS²** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL²** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification.



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

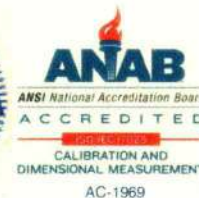
The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCSL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio

End of Calibration Report



MICRO PRECISION CALIBRATION LABORATORY (THAILAND) CO., LTD.
413 BONDSTREET ROAD, TAMBOL BANGPOODAMPHOE PAKKRED, NONTABURI
NONTABURI 11120 THAILAND
66 2 583 9834



Certificate of Calibration

Date: Oct 4, 2023

Cert No. 5523631030389610

Customer:

C E LAB & CONSULTING CO.LTD

245 M.4 T.NONGSAI

A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254699

MPC Control #: EA9584

Asset ID: MP.0.2

Gage Type: MICROPIPETTE

Manufacturer: EPPENDORF

Model Number: N/A

Size: 20-200 ul

Temp/RH: 20.5°C / 55.0%

Location: Calibration performed at MPC facility

Serial Number: O39672F

Department: N/A

Performed By: WATTANA TANGCHAROEN

Received Condition: IN TOLERANCE

Returned Condition: IN TOLERANCE

Cal. Date: October 04, 2023

Cal. Interval: 12 MONTHS

Cal. Due Date: October 04, 2024

Calibration Notes:

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AZ5418	PORTABLE ELECTRONIC BALANCE	WXSS205DU	1123373105	METTLER TOLEDO	May 16, 2024	552363103005903 7 / MP-TH
AS9541	PLATINUM RESISTANCE THERMOMETER	162C	957	ROSEMOUNT ANALYTICAL INC	Jun 19, 2026	TT-0078-23 / NIMT

Procedures Used in this Event

Procedure Name

ASTM E 542-01

Description

Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:

WATTANA TANGCHAROEN

QC Approval:

PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS - Term used when compliance statement is given, and the measurement result is PASS.

PASS² - Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL - Term used when compliance statement is given, and the measurement result is FAIL.

FAIL² - Term used when compliance statement is given, and the measurement result is conditional failed or FAIL².

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED - When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017, ANSI/NCSL Z540.3-2006 and ANSI/NCSL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified; this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Eppendorf Micropipette

MPC Control #: EA9584
Asset ID: MP.0.2

Serial Number: O39672F
Calibration Date: October 4, 2023

Measurement Results

Nominal Value (μl)	Lower Limit (μl)	Mean Indicated Value of Instrument (μl)		Upper Limit (μl)	Result	Uncertainty (μl)
		As Found	As Left			
20	19.50	20.15	20.15	20.50	PASS	± 0.027
100	99.00	99.96	99.96	101.00	PASS	± 0.039
200	198.80	199.89	199.89	201.20	PASS	± 0.054

Note: Accuracy by manufacturer

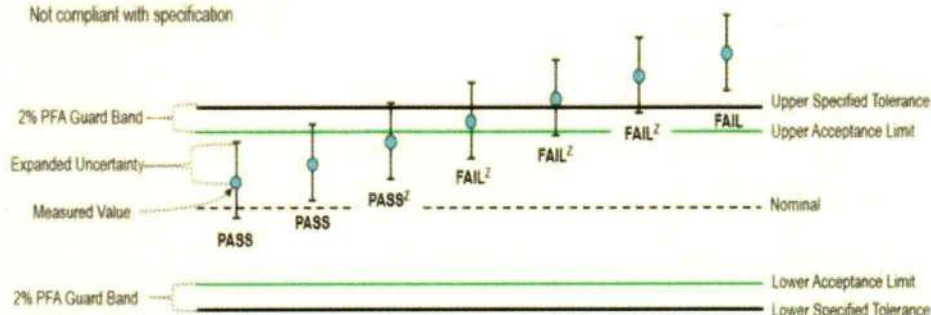
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification.
- PASS^z** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^z** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification.



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCSL Z540.3-2006, Method 5 — Guard Bands Based on Test Uncertainty Ratio.

End of Calibration Report



MICRO PRECISION CALIBRATION LABORATORY (THAILAND) CO., LTD.
413 BONDSTREET ROAD, TAMBOL BANGPOODAMPHOE PAKKRED, NONTABURI
NONTABURI 11120 THAILAND
66 2 583 9834



Certificate of Calibration

Date: Oct 4, 2023

Cert No. 5523631030389617

Customer:

C E LAB & CONSULTING CO.LTD
245 M.4 T.NONGSAI
A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254699

MPC Control #: EA9585
Asset ID: MP.1
Gage Type: MICROPIPETTE
Manufacturer: N/A
Model Number: N/A
Size: 100-1000 ul
Temp/RH: 20.5°C / 55.0%
Location: Calibration performed at MPC facility

Serial Number: YE181AG0199877
Department: N/A
Performed By: WATTANA TANGCHAROEN
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: October 04, 2023
Cal. Interval: 12 MONTHS
Cal. Due Date: October 04, 2024

Calibration Notes:

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AZ5418	PORTABLE ELECTRONIC BALANCE	WXSS205DU	1123373105	METTLER TOLEDO	May 16, 2024	552363103005903 7 / MP-TH
AS9541	PLATINUM RESISTANCE THERMOMETER	162C	957	ROSEMOUNT ANALYTICAL INC	Jun 19, 2026	TT-0078-23 / NIMT

Procedures Used in this Event

Procedure Name	Description
ASTM E 542-01	Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:

WATTANA TANGCHAROEN

QC Approval:

PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS - Term used when compliance statement is given, and the measurement result is PASS.

PASS¹ - Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL - Term used when compliance statement is given, and the measurement result is FAIL.

FAIL² - Term used when compliance statement is given, and the measurement result is conditional failed or FAIL².

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED - When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017, ANSI/NCCL Z540.3-2006 and ANSI/NCCL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Micropipette

MPC Control #:	EA9585	Serial Number:	YE181AG0199877
Asset ID:	MP.1	Calibration Date:	October 4, 2023

Measurement Results

Nominal Value (μl)	Lower Limit (μl)	Mean Indicated Value of Instrument (μl)		Upper Limit (μl)	Result	Uncertainty (μl)
		As Found	As Left			
100	98.00	99.81	99.81	102.00	PASS	± 0.024
500	496.50	501.88	501.88	503.50	PASS	± 0.089
1000	994.00	1004.65	1004.65	1006.00	PASS	± 0.18

Note: Accuracy by manufacturer

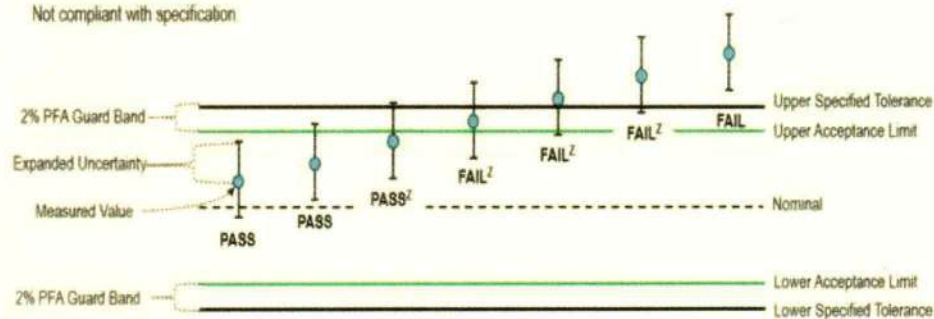
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification.
- PASS^z** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^z** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification.



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCCL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio.

End of Calibration Report



MICRO PRECISION CALIBRATION LABORATORY (THAILAND) CO., LTD.
413 BONDSTREET ROAD, TAMBOL BANGPOODAMPHOE PAKKRED, NONTABURI
NONTABURI 11120 THAILAND
66 2 583 9834



Certificate of Calibration

Date: Oct 4, 2023

Cert No. 5523631030389623

Customer:

C E LAB & CONSULTING CO.LTD

245 M.4 T.NONGSAI

A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254699

MPC Control #: EF4771

Serial Number: QC379903

Asset ID: N/A

Department: N/A

Gage Type: MICROPIPETTE

Performed By: WATTANA TANGCHAROEN

Manufacturer: CAPP BRAVO

Received Condition: IN TOLERANCE

Model Number: B5000-1

Returned Condition: IN TOLERANCE

Size: N/A

Cal. Date: October 04, 2023

Temp/RH: 20.5°C / 55.0%

Cal. Interval: 12 MONTHS

Location: Calibration performed at MPC facility

Cal. Due Date: October 04, 2024

Calibration Notes:

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AZ5418	PORTABLE ELECTRONIC BALANCE	WXSS205DU	1123373105	METTLER TOLEDO	May 16, 2024	552363103005903
AS9541	PLATINUM RESISTANCE THERMOMETER	162C	957	ROSEMOUNT ANALYTICAL INC	Jun 19, 2026	7 / MP-TH TT-0078-23 / NIMT

Procedures Used in this Event

Procedure Name

Description

ASTM E 542-01

Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:

WATTANA TANGCHAROEN

QC Approval:

PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS - Term used when compliance statement is given, and the measurement result is PASS.

PASS¹ - Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL - Term used when compliance statement is given, and the measurement result is FAIL.

FAIL¹ - Term used when compliance statement is given, and the measurement result is conditional failed or FAIL².

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED - When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017, ANSI/NCSL Z540.3-2006 and ANSI/NCSL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Capp Bravo B5000-1 Micropipette

MPC Control #: EF4771
Asset ID: N/A

Serial Number: QC379903
Calibration Date: October 4, 2023

Measurement Results

Nominal Value (mL)	Lower Limit (mL)	Mean Indicated Value of Instrument (mL)		Upper Limit (mL)	Result	Uncertainty (mL)
		As Found	As Left			
1.0	0.9880	1.0063	1.0063	1.0120	PASS	± 0.00015
2.5	2.4800	2.5082	2.5082	2.5200	PASS	± 0.00015
5.0	4.9700	5.0138	5.0138	5.0300	PASS	± 0.00016

Note: Accuracy by manufacturer

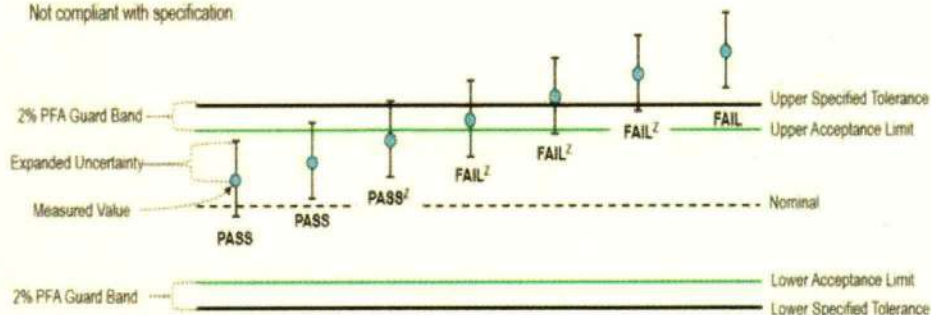
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification.
- PASS^z** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^z** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification.



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCSL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio.

End of Calibration Report

Certificate of Calibration

Date: Oct 2, 2023

Cert No. 5523631030382501

Customer:

C E LAB & CONSULTING CO.LTD
245 M.4 T.NONGSAI
A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9561
Asset ID: VF.10
Gage Type: VOLUMETRIC FLASK
Manufacturer: SCI
Model Number: N/A
Size: 10 ml
Temp/RH: 20.4°C / 55.0%
Location: Calibration performed at MPC facility

Serial Number: N/A
Department: N/A
Performed By: WIKRAI SUCHAISONG
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: September 27, 2023
Cal. Interval: 12 MONTHS
Cal. Due Date: September 27, 2024

Calibration Notes:

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AZ5418	PORTABLE ELECTRONIC BALANCE	WXSS205DU	1123373105	METTLER TOLEDO	May 16, 2024	552363103005903 7 / MP-TH

Procedures Used in this Event

Procedure Name	Description
ASTM E 542-01	Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:

QC Approval:

WIKRAI SUCHAISONG

PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS- Term used when compliance statement is given, and the measurement result is PASS.

PASS²- Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL- Term used when compliance statement is given, and the measurement result is FAIL.

FAIL²- Term used when compliance statement is given, and the measurement result is conditional failed or FAIL².

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED- When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017, ANSI/NCCL Z540.3-2006 and ANSI/NCCL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified. This may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Sci Volumetric Flask

MPC Control #:	EA9561	Serial Number:	N/A
Asset ID:	VF.10	Calibration Date:	September 27, 2023

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
10	9.975	9.995	9.995	10.025	PASS	± 0.0015

Note: Accuracy ± 0.025 ml.

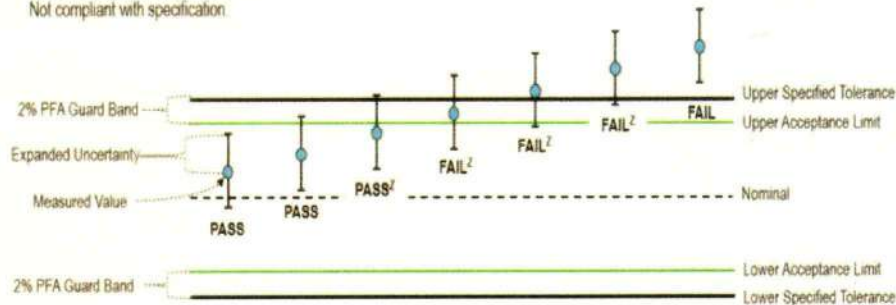
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification.
- PASS^z** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^z** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification.



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCSL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio

End of Calibration Report

Certificate of Calibration

Date: Oct 2, 2023

Cert No. 5523631030382503

Customer:

C E LAB & CONSULTING CO.LTD
245 M.4 T.NONGSAI
A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9562
Asset ID: VF.25
Gage Type: VOLUMETRIC FLASK
Manufacturer: SCHOTT DURAN
Model Number: N/A
Size: 25 ml
Temp/RH: 20.4°C / 55.0%
Location: Calibration performed at MPC facility

Serial Number: N/A
Department: N/A
Performed By: WIKRAI SUCHAISONG
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: September 27, 2023
Cal. Interval: 12 MONTHS
Cal. Due Date: September 27, 2024

Calibration Notes:

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AZ5418	PORTABLE ELECTRONIC BALANCE	WXSS205DU	1123373105	METTLER TOLEDO	May 16, 2024	552363103005903 7 / MP-TH

Procedures Used in this Event

Procedure Name	Description
ASTM E 542-01	Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:

WIKRAI SUCHAISONG

QC Approval:

PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL 2540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS- Term used when compliance statement is given, and the measurement result is PASS.

PASS²- Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL- Term used when compliance statement is given, and the measurement result is FAIL.

FAIL²- Term used when compliance statement is given, and the measurement result is conditional failed or FAIL².

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED- When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017, ANSI/NCSL 2540.3-2006 and ANSI/NCSL 2540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Schott Duran Volumetric Flask

MPC Control #:	EA9562	Serial Number:	N/A
Asset ID:	VF.25	Calibration Date:	September 27, 2023

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
25	24.960	25.010	25.010	25.040	PASS	± 0.0030

Note: Accuracy ± 0.04 ml.

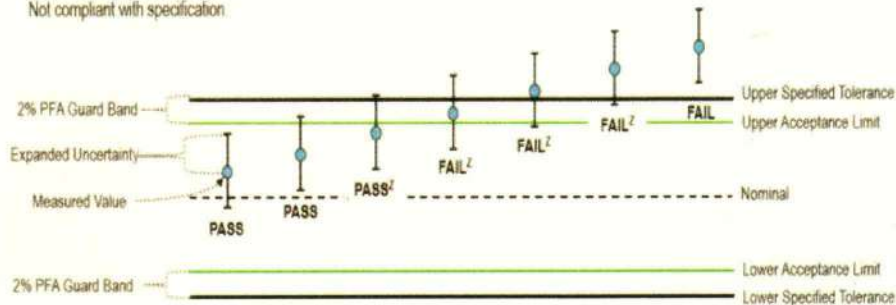
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NC SL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification.
- PASS^z** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^z** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification.



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NC SL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio.

End of Calibration Report

Certificate of Calibration

Date: Oct 2, 2023

Cert No. 5523631030382504

Customer:C E LAB & CONSULTING CO.LTD
245 M.4 T.NONGSAI
A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9563
Asset ID: VF.50
Gage Type: VOLUMETRIC FLASK
Manufacturer: SCHOTT DURAN
Model Number: N/A
Size: 50 ml
Temp/RH: 20.4°C / 55.0%
Location: Calibration performed at MPC facilitySerial Number: N/A
Department: N/A
Performed By: WIKRAI SUCHAISONG
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: September 27, 2023
Cal. Interval: 12 MONTHS
Cal. Due Date: September 27, 2024**Calibration Notes:**

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AZ5418	PORTABLE ELECTRONIC BALANCE	WXSS205DU	1123373105	METTLER TOLEDO	May 16, 2024	552363103005903 7 / MP-TH

Procedures Used in this Event

Procedure Name	Description
ASTM E 542-01	Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:

WIKRAI SUCHAISONG

QC Approval:

PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS- Term used when compliance statement is given, and the measurement result is PASS.

PASS²- Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL- Term used when compliance statement is given, and the measurement result is FAIL.

FAIL²- Term used when compliance statement is given, and the measurement result is conditional failed or FAIL².

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED- When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017, ANSI/NCSL Z540.3-2006 and ANSI/NCSL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified; this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.



Calibration Report of Schott Duran Volumetric Flask

MPC Control #:	EA9563	Serial Number:	N/A
Asset ID:	VF.50	Calibration Date:	September 27, 2023

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
50	49.940	49.973	49.973	50.060	PASS	± 0.0063

Note: Accuracy ± 0.06 ml.

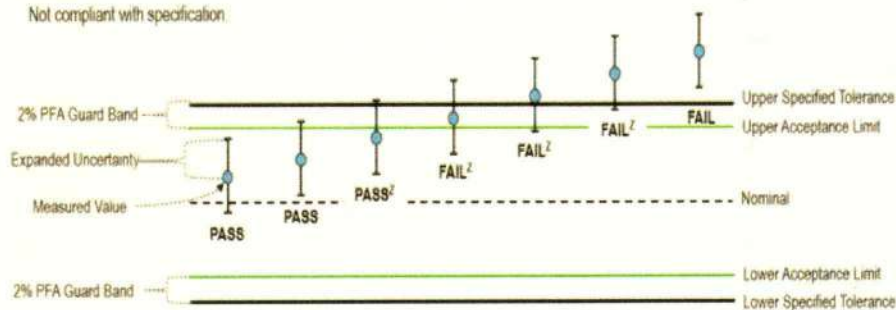
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS — Compliant with specification.
- PASS^z — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^z — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL — Not compliant with specification.



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

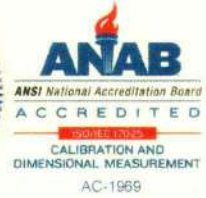
The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCCL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio.

End of Calibration Report



MICRO PRECISION CALIBRATION LABORATORY (THAILAND) CO., LTD.
413 BONDSTREET ROAD, TAMBOL BANGPOODAMPHOE PAKKRED, NONTABURI
NONTABURI 11120 THAILAND
66 2 583 9834



Certificate of Calibration

Date: Oct 2, 2023

Cert No. 5523631030382505

Customer:

C E LAB & CONSULTING CO.LTD
245 M.4 T.NONGSAI
A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9564
Asset ID: VF.100
Gage Type: VOLUMETRIC FLASK
Manufacturer: SCHOTT DURAN
Model Number: N/A
Size: 100 ml
Temp/RH: 20.4°C / 55.0%
Location: Calibration performed at MPC facility

Serial Number: N/A
Department: N/A
Performed By: WIKRAI SUCHAISONG
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: September 27, 2023
Cal. Interval: 12 MONTHS
Cal. Due Date: September 27, 2024

Calibration Notes:

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AZ5418	PORTABLE ELECTRONIC BALANCE	WXSS205DU	1123373105	METTLER TOLEDO	May 16, 2024	552363103005903 7 / MP-TH

Procedures Used in this Event

Procedure Name	Description
ASTM E 542-01	Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:

WIKRAI SUCHAISONG

QC Approval:

PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS: Term used when compliance statement is given, and the measurement result is PASS.

PASS?: Term used when compliance statement is given, and the measurement result is conditional passed or PASS?

FAIL: Term used when compliance statement is given, and the measurement result is FAIL.

FAIL?: Term used when compliance statement is given, and the measurement result is conditional failed or FAIL?

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED - When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017, ANSI/NCCL Z540.3-2006 and ANSI/NCCL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified; this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Schott Duran Volumetric Flask

MPC Control #:	EA9564	Serial Number:	N/A
Asset ID:	VF.100	Calibration Date:	September 27, 2023

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
100	99.900	99.965	99.965	100.100	PASS	± 0.012

Note: Accuracy ± 0.1 ml.

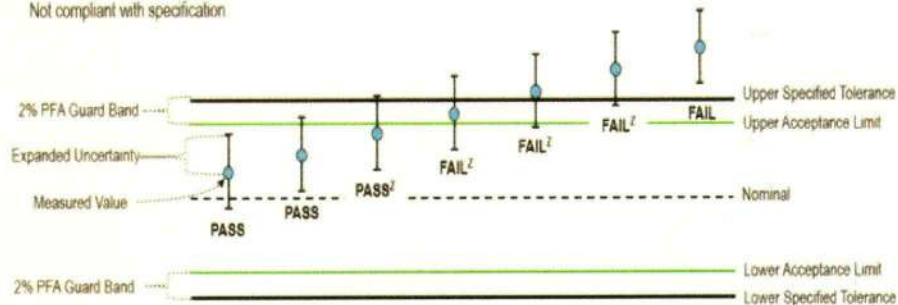
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification.
- PASS^z** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^z** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification.



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCSL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio.

End of Calibration Report

Certificate of Calibration

Date: Oct 2, 2023

Customer:

C E LAB & CONSULTING CO.LTD

245 M.4 T.NONGSAI

A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Cert No. 5523631030382507

Work Order #: THAI-32254697

MPC Control #: EA9565
Asset ID: VF.250
Gage Type: VOLUMETRIC FLASK
Manufacturer: GLASSCO
Model Number: N/A
Size: 250 ml
Temp/RH: 20.4°C / 55.0%
Location: Calibration performed at MPC facility

Serial Number: N/A
Department: N/A
Performed By: WIKRAI SUCHAISONG
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: September 27, 2023
Cal. Interval: 12 MONTHS
Cal. Due Date: September 27, 2024

Calibration Notes:

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
CS7699	ELECTRONIC PRECISION BALANCE	LP 3200D	14805933	SARTORIUS	Feb 3, 2024	551220085652905 / MP-TH

Procedures Used in this Event

Procedure Name	Description
ASTM E 542-01	Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:

WIKRAI SUCHAISONG

QC Approval:

PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS- Term used when compliance statement is given, and the measurement result is PASS.

PASS¹- Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL- Term used when compliance statement is given, and the measurement result is FAIL.

FAIL²- Term used when compliance statement is given, and the measurement result is conditional failed or FAIL¹.

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED- When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017, ANSI/NCCL Z540.3-2006 and ANSI/NCCL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.



Calibration Report of Glassco Volumetric Flask

MPC Control #:	EA9565	Serial Number:	N/A
Asset ID:	VF.250	Calibration Date:	September 27, 2023

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
250	249.850	249.925	249.925	250.150	PASS	± 0.029

Note: Accuracy ± 0.15 ml.

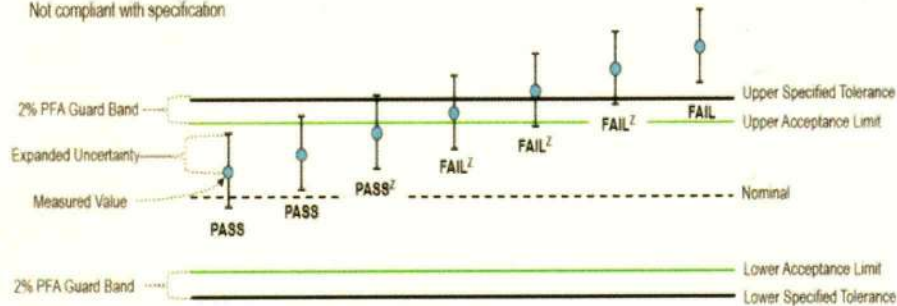
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS — Compliant with specification.
- PASS^z — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^z — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL — Not compliant with specification



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCCL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio.

End of Calibration Report

Certificate of Calibration

Date: Oct 2, 2023

Cert No. 5523631030382509

Customer:C E LAB & CONSULTING CO.LTD
245 M.4 T.NONGSAI
A.DANKHUNHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9566
Asset ID: VF.500
Gage Type: VOLUMETRIC FLASK
Manufacturer: GLASSCO
Model Number: N/A
Size: 500 ml
Temp/RH: 20.4°C / 55.0%
Location: Calibration performed at MPC facilitySerial Number: N/A
Department: N/A
Performed By: WIKRAI SUCHAISONG
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: September 27, 2023
Cal. Interval: 12 MONTHS
Cal. Due Date: September 27, 2024**Calibration Notes:**

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
CS7699	ELECTRONIC PRECISION BALANCE	LP 3200D	14805933	SARTORIUS	Feb 3, 2024	551220085652905 / MP-TH

Procedures Used in this Event

Procedure Name	Description
ASTM E 542-01	Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:

WIKRAI SUCHAISONG

QC Approval:

PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS- Term used when compliance statement is given, and the measurement result is PASS.

PASS²- Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL- Term used when compliance statement is given, and the measurement result is FAIL.

FAIL²- Term used when compliance statement is given, and the measurement result is conditional failed or FAIL².

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED- When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017, ANSI/NCCL Z540.3-2006 and ANSI/NCCL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified; this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

Calibration Report of Glassco Volumetric Flask

MPC Control #:	EA9566	Serial Number:	N/A
Asset ID:	VF.500	Calibration Date:	September 27, 2023

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
500	499.750	499.865	499.865	500.250	PASS	± 0.059

Note: Accuracy ± 0.25 ml.

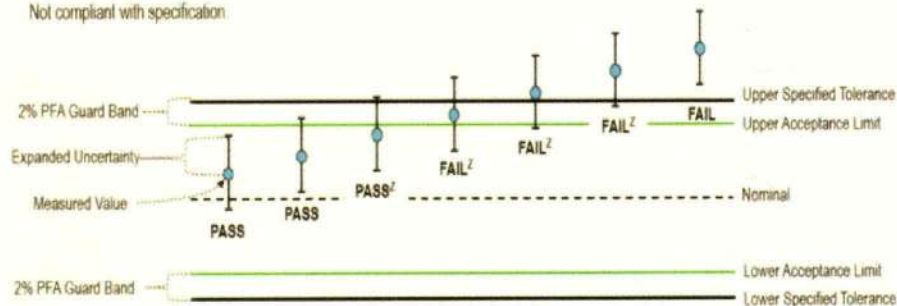
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.

All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS** — Compliant with specification.
- PASS^z** — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^z** — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL** — Not compliant with specification.



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

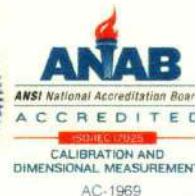
The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCCL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio.

End of Calibration Report



MICRO PRECISION CALIBRATION LABORATORY (THAILAND) CO., LTD.
413 BONDSTREET ROAD, TAMBOL BANGPOODAMPHOE PAKKRED, NONTHABURI
NONTABURI 11120 THAILAND
66 2 583 9834



Certificate of Calibration

Date: Oct 2, 2023

Cert No. 5523631030382511

Customer:

C E LAB & CONSULTING CO.LTD
245 M.4 T.NONGSAI
A.DANKHUNTHOT NAKHONRATCHASIMA 36220

Work Order #: THAI-32254697

MPC Control #: EA9567
Asset ID: VF.1000
Gage Type: VOLUMETRIC FLASK
Manufacturer: GLASSCO
Model Number: N/A
Size: 1000 ml
Temp/RH: 20.4°C / 55.0%
Location: Calibration performed at MPC facility

Serial Number: N/A
Department: N/A
Performed By: WIKRAI SUCHAISONG
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: September 27, 2023
Cal. Interval: 12 MONTHS
Cal. Due Date: September 27, 2024

Calibration Notes:

Please refer to the attached Calibration Report (1 page)

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
CS7699	ELECTRONIC PRECISION BALANCE	LP 3200D	14805933	SARTORIUS	Feb 3, 2024	551220085652905 / MP-TH

Procedures Used in this Event

Procedure Name	Description
ASTM E 542-01	Standard Practice for Calibration of Laboratory Volumetric Apparatus

Calibrating Technician:

WIKRAI SUCHAISONG

QC Approval:

PADUNG SRASUAY

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006.

THE CALIBRATION REPORT STATUS:

PASS- Term used when compliance statement is given, and the measurement result is PASS.

PASS¹- Term used when compliance statement is given, and the measurement result is conditional passed or PASS².

FAIL- Term used when compliance statement is given, and the measurement result is FAIL.

FAIL²- Term used when compliance statement is given, and the measurement result is conditional failed or FAIL².

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED- When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017, ANSI/NCCL Z540.3-2006 and ANSI/NCCL Z540.1-1994. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.



Calibration Report of Glassco Volumetric Flask

MPC Control #:	EA9567	Serial Number:	N/A
Asset ID:	VF.1000	Calibration Date:	September 27, 2023

Measurement Results

Nominal Value (ml)	Lower Limit (ml)	Mean Indicated Value of Instrument (ml)		Upper Limit (ml)	Result	Uncertainty (ml)
		As Found	As Left			
1000	999.600	999.761	999.761	1000.400	PASS	± 0.12

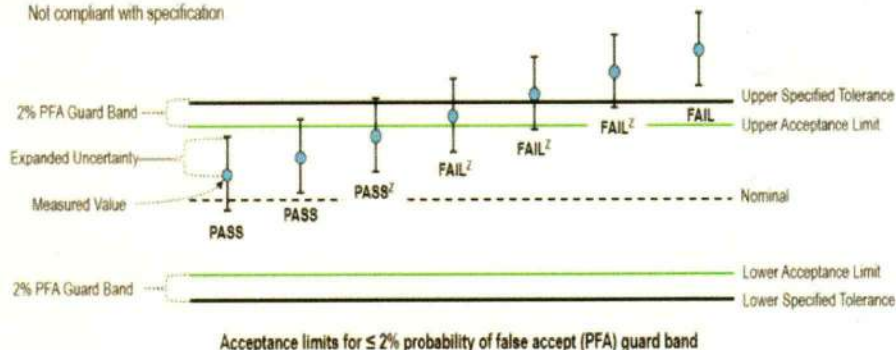
Note: Accuracy ± 0.4 ml.

Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification.
All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCCL Z540.3-2006

The status of compliance with the acceptance criteria is reported as:

- PASS — Compliant with specification.
- PASS^z — The measured value is within acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.
- FAIL^z — The measured value is not within the acceptance limits.
However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.
- FAIL — Not compliant with specification



The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated.

This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCCL Z540.3-2006, Method 6 — Guard Bands Based on Test Uncertainty Ratio.

End of Calibration Report



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 15 August, 2023

Certification No. 289/23

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : LSI LASTEM

Type : wind speed and wind direction DNA 121

Serial No. : wind speed and wind direction 21100220

Customer : C E LAB & CONSULTING CO.,LTD.

245 M.4 T.Nongsai A.DanKhum Thot

Nakorn Ratchasima Thailand.36220.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1006.5 hPa

NATIONAL STANDARD WIND TUNNEL :

: Thermal Anemometer 642 S/N 91563

: HOOK GAGE NO 1425 Pitot Tube Theodor Friedrichs Type 0800.0000 serial 9023

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)

Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION

: Standard Velocity at 0 - 20 m/sec

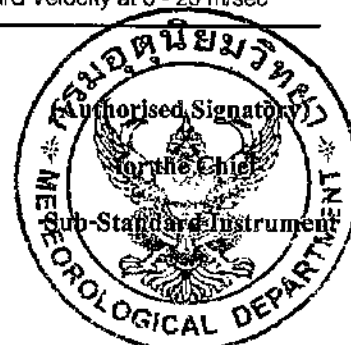
Calibrated by : 

Mr. Watcharapol Subwat

Mechanical Engineer

Signed :


Mr. Pisod Promsut





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 289/23

15 August, 2023

Page : 2 of 2

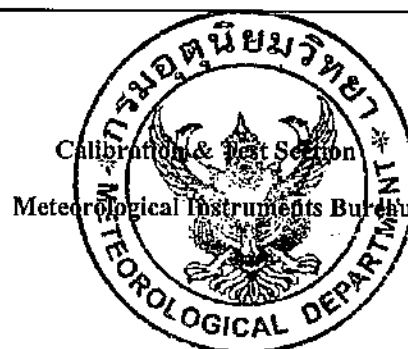
Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacuum	Velocity	Velocity	Correction
	inches H2O	inches H2O	m/sec	m/sec	m/sec
1.00	-	-	-	1.0	0.00
3.02	-	-	-	3.0	0.02
5.00	-	-	-	5.0	0.00
7.04	-	-	-	7.0	0.04
9.02	-	-	-	9.0	0.02
11.01	-	-	-	11.0	0.01
13.01	-	-	-	13.0	0.01
15.01	-	-	-	14.9	0.11
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.0	0.02

Wind Aloft Plotting Board.	
US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :

Wachapol

Mr. Wachapol Subwat
Mechanical Engineer



SITHIPORN ASSOCIATES CO.,LTD.

CALIBRATION LABORATORY

451-451/1 Sirinthorn Rd.,Bangbumru, Bangplud Bangkok 10700 THAILAND.
Tel.0-2435-8800 Fax.0-2433-1679 e-mail:cal-center@sithiphorn.com http://www.sithiphorn.com



Cert. No. : ACC23023

Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR
Manufacturer : RION
Model : NC-74
Serial No.: 34178137
ID No.: -

Condition As Found : GOOD

Customer : KINETICS CORPORATION LTD.
388 RATCHADAPISEK ROAD, 32 CHANDRAKSEM,
CHATUCHAK, BANGKOK 10900 THAILAND.

Location : -
Ambient Temperature : (23.0 \pm 3) °C
Pressure : (101.3 \pm 3) kPa
Relative Humidity : (50.0 \pm 20) %

Received Date : 10 AUGUST 2023
Calibration Date : 23 AUGUST 2023
Date of Issue : 24 AUGUST 2023

Calibrated by :

Nathakorn Pisutpaisan

Approved by :


(Thanakul Petchurai)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Continuation of Calibration Certificate

Cert. No. : ACC23023

Job No. : VC66AC0079

Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :

This equipment was calibrated by based on IEC-60942-2003 Standard.

The sound pressure level, frequency and total distortion of the sound calibrator was measured using the reference microphone.

Condition of this result of calibration :

1. Reference Standard Instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
Waveform Generator	33511B	MY52302742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL,BP 30/0266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EEL,BP 30/0267	13-FEB-24
Digital Multimeter	33461A	MY60024273	EEL,BP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KAI	34560495	AA-3002-23	14-FEB-24
Audio Analyzer	AVR-3360A	V744B6069	EF-0012-23	10-FEB-24

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Continuation of Calibration Certificate

Cert No. : ACC23023

Job No. : VC66AC0079

Pages : 3 of 3

Result of calibration :**1. Sound pressure level**

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
94	94.01	0.01	0.14	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Acceptance limit (%)
1000	1001.8	0.2	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Acceptance limit (%)
1.73	0.10	3.0

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$
or any value following calculation, providing a level of confidence of approximately 95 %

————— End of Calibration Certificate —————

SITHIPHORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Sirinthorn Rd.,Bangbumru, Bangplud Bangkok 10700 THAILAND.
Tel.0-2435-8800 Fax.0-2433-1679 e-mail:cal-center@sithiphorn.com http://www.sithiphorn.com



Cert. No. : ACL23256

Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00171586 / 168560 / 61914
ID No.: -

Condition As Found : GOOD

Customer : KINETICS CORPORATION LTD.
388 RATCHADAPISEK ROAD, 32 CHANDRAKSEM,
CHATUCHAK, BANGKOK 10900 THAILAND.

Location : -
Ambient Temperature : (23.0 \pm 3) °C
Pressure : (101.3 \pm 3) kPa
Relative Humidity : (50.0 \pm 20) %

Received Date : 10 AUGUST 2023
Calibration Date : 15 AUGUST 2023
Date of Issue : 22 AUGUST 2023

Calibrated by :

Nathakorn Pisutpaisan

Approved by :


(Thanakul Petchurai)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Continuation of Calibration Certificate

Cert. No. : ACL23256

Job No. : VC66AC0079

Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).

The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
Waveform Generator	33210A	MY48017076	EF-0009-23	07-FEB-24
Waveform Generator	33511B	MY52302742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL.BP 30/0266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EEL.BP 29/0266	13-FEB-24
Digital Multimeter	34461A	MY60024273	EEL.BP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KAI	34560495	AA-3002-23	14-FEB-24

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Continuation of Calibration Certificate

Cert. No. : ACL23256

Job No. : VC66AC0079

Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

Note : Pass/Fail evaluation for each parameter,
will be considered together from the acceptance limit and the Maximum-permitted uncertainty of measurement.

Continuation of Calibration Certificate

Cert. No. : ACL23256

Job No. : VC66AC0079

Pages : 4 of 8

Result of calibration :**1. Absolute sensitivity**

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.98)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
17.1

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Measured value (dB)
A - weight	15.7
C - weight	20.3
Flat	25.7

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.0	0.1	0.1	± 1.5
1000	0.0	-0.1	-0.1	± 1.0
8000	0.7	0.8	0.8	±5.0

Continuation of Calibration Certificate

Cert. No. : ACL23256
Job No. : VC66AC0079
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	-0.1	-0.1	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	-0.1	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.0	0.0	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.3

Continuation of Calibration Certificate

Cert. No. : ACL23256

Job No. : VC66AC0079

Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.1	0.1	± 1.1
136.0	136.1	0.1	± 1.1
135.0	135.1	0.1	± 1.1
134.0	134.1	0.1	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.1	0.1	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.1	0.1	± 1.1
114.0	114.1	0.1	± 1.1
109.0	109.1	0.1	± 1.1
104.0	104.1	0.1	± 1.1
99.0	99.1	0.1	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.1	0.1	± 1.1
30.0	30.1	0.1	± 1.1
29.0	29.2	0.2	± 1.1
28.0	28.3	0.3	± 1.1
27.0	27.4	0.4	± 1.1
26.0	26.5	0.5	± 1.1
25.0	25.6	0.6	± 1.1

Continuation of Calibration Certificate

Cert. No. : ACL23256
Job No. : VC66AC0079
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.8	-0.2	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
One	136.4	136.0	-0.4	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

Continuation of Calibration Certificate

Cert. No. : ACL23256

Job No. : VC66AC0079

Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$
or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate



Certificate of Calibration

Certificate No.: WK2311-300-84

Page 1 of 2

Customer : C E LAB & CONSULTING CO.,LTD.
245 M.4 T.NONGSAI A.DANKHUNTHOT
NAKHON RATCHASIMA, THAILAND 36220

Instrument	: Digital Thermometer with Sensor	Ambient Temperature	: (25.0 ± 2) °C
Manufacturer	: Testo	Humidity	: (50.0 ± 15) %RH
Model	: 925	Received Date	: 21-Nov-23
Serial No.	: 34827824/904	Calibrated Date	: 21-Nov-23
Identity No.	: CE-DIG-001	Issued Date	: 21-Nov-23
Range	: 3 °C to 180 °C	Calibrated Location	: In Lab
Resolution	: 0.1 °C		
Calibration Method	: CP-WK-T09		

Reference standard instruments :

<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Platinum Resistance Thermometer	895	PSL-T 0540/66	13-Jul-24	TISTR

TISTR : Thailand Institute of Scientific and Technological Research.

This result calibrate was found accurate as shown on date place of calibrate only

This certificate is traceability to the International System of Unit (SI)

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence approximately 95%

Calibrated by : Ms.Usa Phuangphiphat

Approved by :

Mr. Ratchadawut Rungravee

Authorized Signatory

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Calibration Results

Certificate No. : WK2311-300-84

Page 2 of 2

Calibration Result of the Accuracy

Function : Temperature Measurement with Sensor

Range : 3 °C to 180 °C

Resolution : 0.1 °C

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (± °C)
3	3.00	2.60	-0.4	0.18
20	20.00	20.20	0.2	0.18
95	95.00	95.40	0.4	0.18
104	104.00	104.30	0.3	0.18
110	110.00	110.20	0.2	0.18
145	145.00	144.80	-0.2	0.18
180	180.00	179.50	-0.5	0.18

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**** End of Certificate****