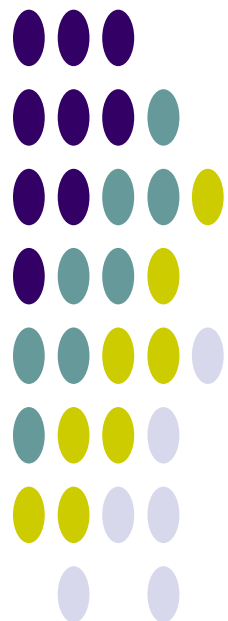


ภาคผนวก จ

เอกสารสอบเทียบเครื่องมือ





JIRANATEE ASSOCIATES CO.,LTD.

Jiranatee Associates Co.,Ltd.
63/14-15, 67/35-36
Petchkasem 7,7/1, Rd. Watthapra, Bangkokyai,
Bangkok 10600 (Thailand)
Tel: +6608680812
Mobile: +66863999453
E-mail: jnac-calibration@jiranatee.com
Web site: www.jiranatee.com

Accredited calibration laboratory
ISO/IEC 17025:2017
NSC-TISI-TIS 17025
CALIBRATION 0367

Flow measurement laboratory
Calibration services department.



CERTIFICATE OF CALIBRATION

Certificate No. : COF-032-68

Page 1 of 2 Pages

MEASUREMENT ITEM : Top Load Orifice
MANUFACTURER : TISCH
MODEL/TYPE : TE-5025A
SERIAL NUMBER : 3092
ID NUMBER : -
CONDITION AS-RECEIVED : Used item
CUSTOMER : TOPS-LAB Consultants CO., LTD.
Head Office No. 189 Moo 3 Bangrakphatthana, Bangbuathong,
Nonthaburi 11110 Thailand.

RECEIVED DATE : 19 Aug 2025
MEASUREMENT DATE : 25 Aug 2025
ISSUE DATE : 25 Aug 2025

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature	: 23.0 ± 3.0	°C
Relative Humidity	: 55.0 ± 15.0	%RH
Atmospheric Pressure	: 1010 ± 10	hPa

CALIBRATION CONDITION:

Preconditioning : 24 hours at ambient conditions.
Measurement Condition : The average values during measurement are 23.4 °C and 53.6 %RH.

NOTED: The certificate is valid only to the item calibrated on date and place of calibration.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibration procedure:

The Orifice gas flow device was calibrated against Standard Rotary Displacement Meter (Roots Meter) Model G65/IMC/W2-dp. The WI-CL-004 was used as a calibration guideline.

Traceability:

This certificate provides a traceability of the measurement to recognized the national standards, and to realization of the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) via Certificate number: MW-0016-25.

Uncertainty of Measurement:

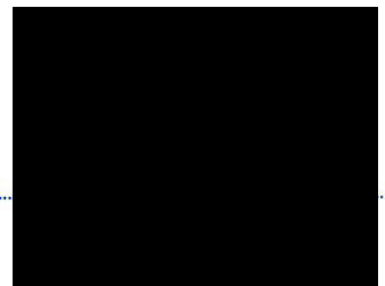
The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor $k=2$, Which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with the GUM 'Evaluation of measurement data - Guide to the expression of uncertainty in measurement'

Calibrated by:

- ☐ Mr. Sorawit Thachalad
☒ Miss Jittaporn Lertsomphol



Approved signatory:



MEASUREMENT RESULTS:

The Orifice gas flow device was calibrated by direct comparison method with the Standard Rotary Displacement Meter (Roots Meter). The Humid air was used as a medium in the system. The standard conditions are 25°C (298.15 K) and 760 mmHg for standard temperature and standard pressure respectively.

Table 1: The results of Q Standard calibration data

Plate	Flow rate m ³ /min	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	Δp_{meter} mmHg	$\Delta p_{\text{Orifice}}$ inH ₂ O	Y	Standard Flow [Q_s] m ³ /min
1	0.701	754.711	23.34	22.49	54.084	1.800	1.341	0.652
2	1.003	754.725	23.39	22.62	58.704	3.632	1.904	0.926
3	1.118	754.760	23.56	22.91	40.402	4.777	2.183	1.058
4	1.168	754.762	23.91	23.34	30.130	5.362	2.312	1.120
5	1.412	754.668	24.05	23.70	29.980	7.852	2.797	1.352

Slope (m): **2.08148**
 Intercept (b): **-0.01902**
 Correlation coefficient (r): **0.99979**
 Uncertainty ($k=2$): **0.015 m³/min**

Table 2: The results of Q actual calibration data

Plate	Flow rate m ³ /min	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	Δp_{meter} mmHg	$\Delta p_{\text{Orifice}}$ inH ₂ O	Y	Standard Flow [Q_s] m ³ /min
1	0.701	754.711	23.34	22.49	54.084	1.800	0.841	0.653
2	1.003	754.725	23.39	22.62	58.704	3.632	1.195	0.927
3	1.118	754.760	23.56	22.91	40.402	4.777	1.370	1.060
4	1.168	754.762	23.91	23.34	30.130	5.362	1.453	1.123
5	1.412	754.668	24.05	23.70	29.980	7.852	1.758	1.357

Slope (m): **1.30369**
 Intercept (b): **-0.01191**
 Correlation coefficient (r): **0.99979**
 Uncertainty ($k = 2$): **0.015 m³/min**

End of Certificate of Calibration



CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E07NI99E15A0002
Cylinder Number: EB0125123
Laboratory: 124 - Durham (SAP) - NC
PGVP Number: B22019
Gas Code: APPVD

Reference Number: 122-401652592-1
Cylinder Volume: 143.7 Cubic Feet
Cylinder Pressure: 2016 PSIG
Valve Outlet: 660
Certification Date: Nov 06, 2019

Expiration Date: Nov 06, 2027

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	55.00 PPM	54.81 PPM	G1	+/- 0.9% NIST Traceable	10/29/2019, 11/06/2019
NITRIC OXIDE	55.00 PPM	54.80 PPM	G1	+/- 0.9% NIST Traceable	10/29/2019, 11/06/2019
SULFUR DIOXIDE	55.00 PPM	52.99 PPM	G1	+/- 1.0% NIST Traceable	10/29/2019, 11/06/2019
METHANE	180.0 PPM	172.9 PPM	G1	+/- 0.7% NIST Traceable	10/29/2019
PROPANE	180.0 PPM	178.5 PPM	G1	+/- 1.3% NIST Traceable	10/30/2019
CARBON DIOXIDE	950.0 PPM	958.7 PPM	G1	+/- 0.6% NIST Traceable	10/29/2019
CARBON MONOXIDE	4500 PPM	4469 PPM	G1	+/- 0.7% NIST Traceable	10/30/2019
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	16060657	CC465102	50.42 PPM NITRIC OXIDE/NITROGEN	+/- 0.8%	Jun 27, 2020
PRM	PRM	D562879	10.01 PPM NITROGEN DIOXIDE/AIR	+/- 1.9%	Aug 17, 2018
NTRM	17060225	EB0079096	100.3 PPM NITRIC OXIDE/NITROGEN	+/- 1.0%	Jul 23, 2023
RGM	12362	SG916305BAL	4.701% % PROPANE/NITROGEN	+/- 0.3%	Jun 04, 2020
GMIS	124206889114	CC322698	4.432 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Aug 15, 2021
NTRM	14010338	ND48595	49.08 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.9%	Apr 17, 2024
NTRM	12060910	CC356255	98.05 PPM METHANE/NITROGEN	+/- 0.6%	Dec 22, 2023
NTRM	10060806	CC317625	933.7 PPM CARBON DIOXIDE/NITROGEN	+/- 0.5	May 09, 2020
NTRM	080123	KAL004604	4857 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jun 07, 2024
GMIS	124504060104	CC86856	4.8803 % PROPANE/NITROGEN	+/- 0.4%	Oct 22, 2023

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
Nicolet 6700 AHR0801549 CO2	FTIR	Oct 17, 2019
Horiba VIA510 CO RS2EGL6K	Nondispersive Infrared (NDIR)	Oct 30, 2019
Nicolet 6700 AHR0801549 CH4	FTIR	Oct 17, 2019
Nicolet 6700 AHR0801549 NO	FTIR	Oct 17, 2019
Nicolet 6700 AHR0801549 NO	FTIR	Oct 17, 2019
Varian 3800 C3H8	Gas Chromatograph	Oct 02, 2019
Nicolet 6700 AHR0801549 SO2	FTIR	Oct 17, 2019

Triad Data Available Upon Request

NOTES: GROSS WEIGHT: 28,750 g

NET WEIGHT: 4,327.9 g

Signature on file

Approved for Release



www.accl-calibration.com
www.accl-cal.com
www.noufoun909a.com

ADVANTAGE CENTER CO., LTD.

59/494 M.6, Frakham Road, T.Kukhot, Lumlookkar, Pathumthani 12130 Thailand.

Tel. (66-2) 9873248-50 Fax: (66-2) 9873252 E-mail: info.accl2662@gmail.com

pornsak2008@yahoo.co.th

CALIBRATION LABORATORY

Certificate No. RS-2601040-1

Job No. RS-2601040

Certificate of Calibration

FOR

Equipment Name : Sound Calibrator

Manufacturer : SCARLET TECH

Model : ST-120

Serial Number : ST120C0231E

Customer Code : N/A

Location of Calibration : In Lab

Customer Name : TOPS-LAB Consultants Co., Ltd.

189 moo 3 Bangrakphattana Bangbuathong Nonthaburi 11110

Calibration Procedure : CPE-04-01

Received Date : Jan 15, 2026

Calibration Date : Jan 15, 2026

Recommended Due Date : N/A

CONDITION AS RECEIVED : Normal

Environmental Conditions

Ambient Temperature : $(25 \pm 2) ^\circ\text{C}$

Relative Humidity : $(50 \pm 15) \% \text{RH}$

Result : No Adjustment (See data attached in page 3 to the end of certificate)

1. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by

Calibration Laboratory, Advantage Center Co., Ltd.

Calibrated by : P. Noppadon

Approved by :

Date of Issue : Feb 6, 2026

Page 1 of 3

Test Equipment Calibration, In-house Calibration Preparations, Source Inspection ISO 9000 / 14000 Consultation, Statistical Quality Control, Statistical Production Control, New Product Sourcing, Troubleshooting, Safety Engineering consultations / Applications for world wide Approvals and Certifications.

Certificate No.: RS-2601040-1

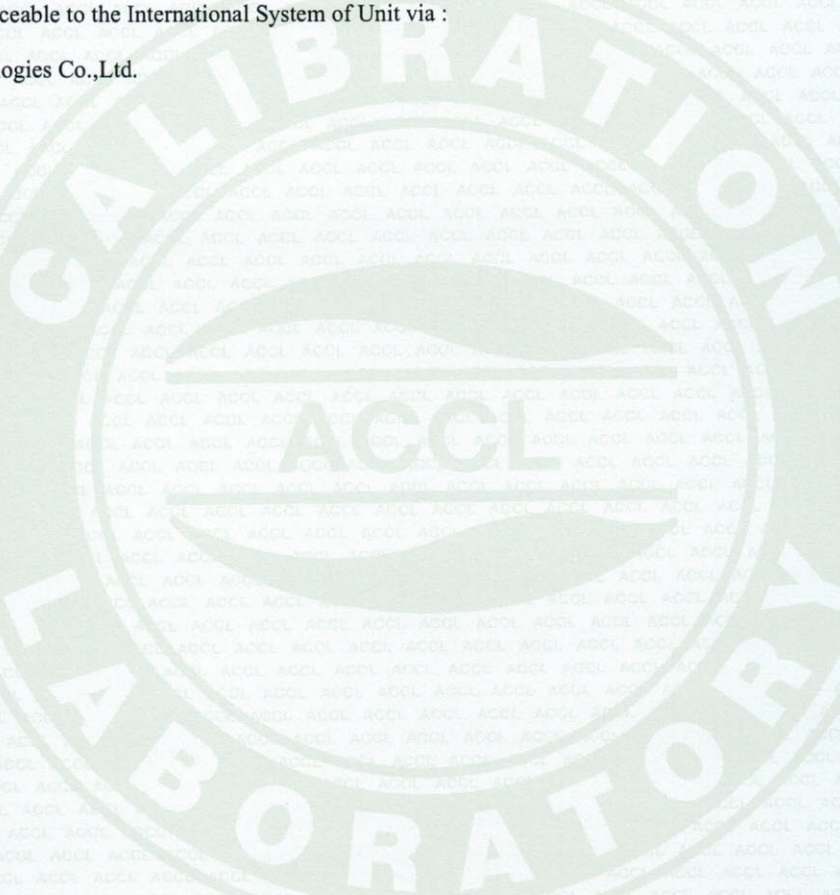
Reference Standards

Equipment Name	Serial No.	Certificate No.	Due Date	Traceability to
Digital Sound Level Meter	HF:2556826	RA-2511002-21	Dec 1, 2026	NA

Traceability

This calibration is traceable to the International System of Unit via :

- NA : NA Caltecnologies Co.,Ltd.



Certificate No. : RS-2601040-1

Result of Calibration

Calibration Range : 94 dB, 114 dB

Frequency : 1 kHz

UUC Setting	STD Reading (dB)	Correction (dB)	Uncertainty of Measurement (± dB)
94 dB	93.7	0.3	0.10
114 dB	114.3	-0.3	0.10

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -



**SMART TECH CALIBRATION & SERVICES CO., LTD.**

14/506 MOO 3, RANGSIT-NAKHON NAYOK ROAD, LAM PHAK KUT,
THANYABURI, PATHUM THANI 12110, THAILAND

Tel. +662-114-3148 Email : stcal.md@gmail.com Website : stc-cal.com



Certificate of Calibration

Certificate No. STCR-2601242-1

Work Order No. STCR-2601242

Page 1 of 3

Customer Name : TOPS-LAB Consultants Co., Ltd.
189 Moo 3, Bangrakphatthana, Bangbuathong, Nonthaburi 11110

Equipment Name : Sound Level Meter
Manufacturer : SCARLET TECH
Model : ST-11D
Serial Number : 820880
Control Number : TLC-S-033
Received Date : Jan 15, 2026
Calibration Date : Jan 15, 2026
Recommended Due Date : Jan 15, 2027
Calibration Method : Calibration Procedure No. CPE-04-01

Environmental Conditions

Ambient Temperature : $(25 \pm 2) ^\circ\text{C}$
Ambient Relative Humidity : $(50 \pm 15) \% \text{RH}$
Calibration Place : Permanent Calibration Laboratory

Condition as received : Normal

Calibration Result : See data attached

1. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Smart Tech Calibration & Services Co., Ltd.
5. This results of this report only to the items calibrated.

Date of Issue : Jan 15, 2026

Calibrated by : H. Natthaphon

Approved by :



@smarttechcal

Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2601242-1

Page 2 of 3

Standards Equipment Used

<u>Equipment Name</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Sound Calibrator	N975185	5523631032296324	Oct 31, 2026	MP-TH

Traceability

This calibration is traceable to the International System of Unit via :

- MP-TH : Micro Precision Calibration Laboratory (Thailand) Co., Ltd.



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2601242-1

Page 3 of 3

UUC Range : (27 to 140) dB

Resolution : 0.1 dB

Results of Calibration: [] Without adjustment [☒] With adjustment

Appearance and Function of Use Inspection : GOOD

Sound Level Calibration @ Frequency 1 kHz

Select : A

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.07 dB	93.5 dB	94.0 dB	0.07 dB	0.40 dB
	114.06 dB	113.3 dB	113.9 dB	0.16 dB	0.40 dB
SLOW	94.07 dB	93.5 dB	94.0 dB	0.07 dB	0.40 dB
	114.06 dB	113.3 dB	113.9 dB	0.16 dB	0.40 dB

Sound Level Calibration @ Frequency 1 kHz

Select : C

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.07 dB	93.5 dB	94.0 dB	0.07 dB	0.40 dB
	114.06 dB	113.3 dB	113.9 dB	0.16 dB	0.40 dB
SLOW	94.07 dB	93.5 dB	94.0 dB	0.07 dB	0.40 dB
	114.06 dB	113.3 dB	113.9 dB	0.16 dB	0.40 dB

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -



CALIBRATION LABORATORY

Certificate No. RS-2601051-4

Job No. RS-2601051

Certificate of Calibration

FOR

Equipment Name : Sound Level Meter

Manufacturer : SCARLET TECH

Model : ST-11D

Serial Number : 820951

Customer Code : N/A

Location of Calibration : In Lab

Customer Name : TOPS-LAB Consultants Co., Ltd.

189 moo 3 Bangrakphattana Bangbuathong Nonthaburi 11110

Calibration Procedure : CPE-04-01

Received Date : Feb 14, 2026

Calibration Date : Feb 15, 2026

Recommended Due Date : N/A

CONDITION AS RECEIVED : Normal

Environmental Conditions

Ambient Temperature : $(25 \pm 2) ^\circ\text{C}$

Relative Humidity : $(50 \pm 15) \% \text{RH}$

Result : No Adjustment (See data attached in page 3 to the end of certificate)

1. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Advantage Center Co., Ltd.

Calibrated by : J. Sutep

Approved by :

Date of Issue : Feb 13, 2026

Certificate No.: RS-2601051-4

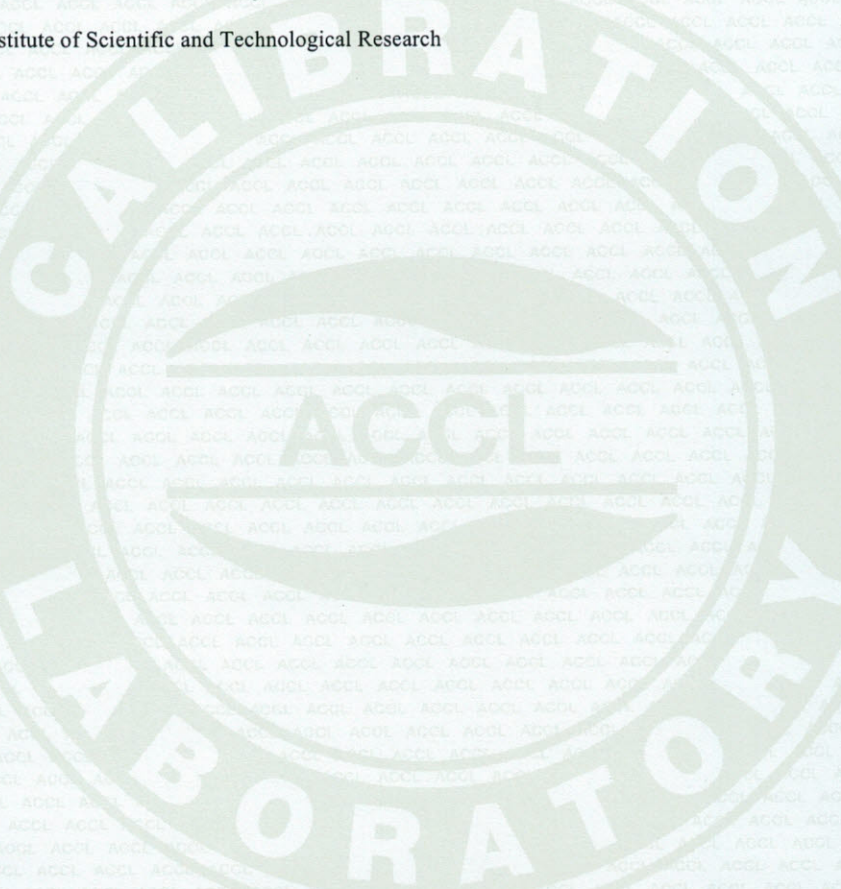
Reference Standards

Equipment Name	Serial No.	Certificate No.	Due Date	Traceability to
Sound Calibrator	170603302	EEL.BP. 76/1068	Oct 28, 2026	TISTR

Traceability

This calibration is traceable to the International System of Unit via :

- TISTR : Thailand Institute of Scientific and Technological Research



Certificate No. : RS-2601051-4

Result of Calibration

Calibration Range : 94 dB, 114 dB

Function : Mesurement @ 1 kHz

Select A Fast response

STD Setting	UUC Reading (dB)	Correction (dB)	Uncertainty of Measurement (± dB)
94 dB	94.3	-0.3	0.21
114 dB	114.3	-0.3	0.28

Select A Slow response

STD Setting	UUC Reading (dB)	Correction (dB)	Uncertainty of Measurement (± dB)
94 dB	94.3	-0.3	0.21
114 dB	114.3	-0.3	0.28

Select C Fast response

STD Setting	UUC Reading (dB)	Correction (dB)	Uncertainty of Measurement (± dB)
94 dB	94.3	-0.3	0.21
114 dB	114.3	-0.3	0.28

Select C Slow response

STD Setting	UUC Reading (dB)	Correction (dB)	Uncertainty of Measurement (± dB)
94 dB	94.3	-0.3	0.21
114 dB	114.3	-0.3	0.28

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -





www.accl-calibration.com
www.accl-cal.com
www.aeccl.com

ADVANTAGE CENTER CO., LTD.

59/494 M.6, Frakham Road, T.Kukhot, Lumlookkar, Pathumthani 12130 Thailand.

Tel. (66-2) 9873248-50 Fax: (66-2) 9873252 E-mail: info.accl2662@gmail.com

pornsak2008@yahoo.co.th



CALIBRATION LABORATORY

Certificate No. RS-2601051-5

Job No. RS-2601051

Certificate of Calibration

FOR

Equipment Name : Sound Level Meter

Manufacturer : SCARLET TECH

Model : ST-11D

Serial Number : 820952

Customer Code : N/A

Location of Calibration : In Lab

Customer Name : TOPS-LAB Consultants Co., Ltd.

189 moo 3 Bangrakphattana Bangbuaathong Nonthaburi 11110

Calibration Procedure : CPE-04-01

Received Date : Feb 14, 2026

Calibration Date : Feb 15, 2026

Recommended Due Date : N/A

CONDITION AS RECEIVED : Normal

Environmental Conditions

Ambient Temperature : (25 ± 2) °C

Relative Humidity : (50 ± 15) %RH

Result : No Adjustment (See data attached in page 3 to the end of certificate)

1. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Advantage Center Co., Ltd.

Calibrated by : J. Sutep

Approved by :

Date of Issue : Feb 13, 2026

Laboratory Management

Page 1 of 3

Certificate No.: RS-2601051-5

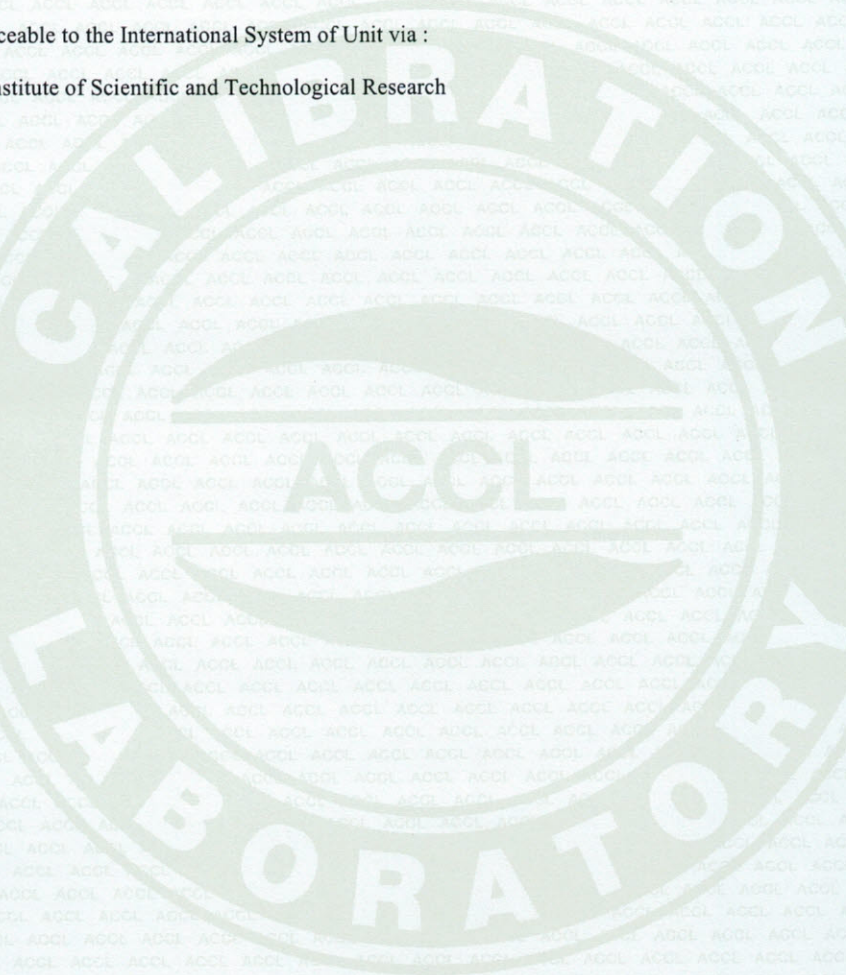
Reference Standards

Equipment Name	Serial No.	Certificate No.	Due Date	Traceability to
Sound Calibrator	170603302	EEL.BP. 76/1068	Oct 28, 2026	TISTR

Traceability

This calibration is traceable to the International System of Unit via :

- TISTR : Thailand Institute of Scientific and Technological Research



Certificate No. : RS-2601051-5

Result of Calibration

Calibration Range : 94 dB, 114 dB

Function : Measurement @ 1 kHz

Select A Fast response

STD Setting	UUC Reading (dB)	Correction (dB)	Uncertainty of Measurement (± dB)
94 dB	94.2	-0.2	0.21
114 dB	114.1	-0.1	0.28

Select A Slow response

STD Setting	UUC Reading (dB)	Correction (dB)	Uncertainty of Measurement (± dB)
94 dB	94.2	-0.2	0.21
114 dB	114.1	-0.1	0.28

Select C Fast response

STD Setting	UUC Reading (dB)	Correction (dB)	Uncertainty of Measurement (± dB)
94 dB	94.2	-0.2	0.21
114 dB	114.1	-0.1	0.28

Select C Slow response

STD Setting	UUC Reading (dB)	Correction (dB)	Uncertainty of Measurement (± dB)
94 dB	94.2	-0.2	0.21
114 dB	114.1	-0.1	0.28

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -





ID LINE : IEC17025

Certificate of Calibration

Certificate Number : SPR25010109-5 Page : 1 of 3
Customer : TOPS-LAB Consultants CO., LTD.
189 Moo. 3 Bangrakphatthana Bangbuathong Nonthaburi 11110

Equipment Name	: Sound Level Meter		
Manufacturer	: Scarlet Tech		
Model	: ST-11D		
Serial Number	: 820953		
ID. Number	: TLC-S-030		
Environmental Conditions			
Ambient Temperature	: 23 °C $\pm$ 3 °C	Received Date	: 10 Jan 2025
Relative Humidity	: 50 % $\pm$ 15 %	Calibration Date	: 16 Jan 2025
Location of Calibration	: In-Lab	Recommend Due Date	: 16 Jan 2026
Calibration Procedure	: SP-CPE-04-01	Date of Issue	: 17 Jan 2025

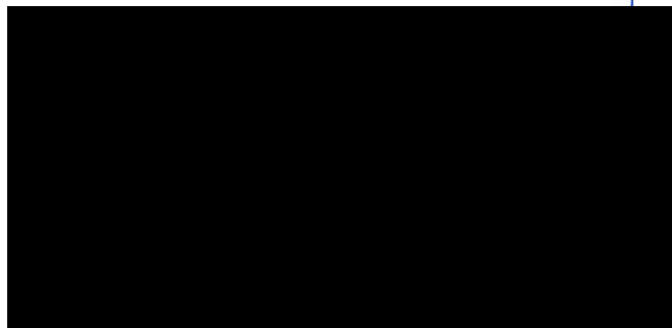
Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Nanthawat Wanasit

Calibration Officer





ID LINE : IEC17025

Calibration Report

Certificate Number : SPR25010109-5

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 140/0167	26 Jan 2025

Traceability

This certification is traceable to the International System of Unit maintained at :

TISTR - Thailand Institute of Scientific and Technological Research



ID LINE : IEC17025

Result of Calibration

Certificate Number : SPR25010109-5

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.8	93.8	-0.2	-0.2	0.15
114	113.7	113.7	-0.3	-0.3	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.8	93.8	-0.2	-0.2	0.15
114	113.7	113.7	-0.3	-0.3	0.15

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The 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 -

CALIBRATION REPORT

Page 1 of 1 Pages

MEASUREMENT ITEM : Digital smoke meter
MANUFACTURER : Wager Company
MODEL/TYPE : 6500
SERIAL NUMBER : 011044
ID NUMBER : -
CONDITION AS-RECEIVED : Used item
CUSTOMER : TOPS-LAB Consultants Co., Ltd.
 189 Moo 3 Bangrakphatthana, Bangbuathong,
 Nonthaburi 11110

RECEIVED DATE : 03 Sep 2025
MEASUREMENT DATE : 17 Sep 2025
ISSUE DATE : 17 Sep 2025

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature	: 23.0 ± 3.0	°C
Relative Humidity	: 55.0 ± 15.0	%RH
Atmospheric Pressure	: 1010 ± 10	hPa

PRECONDITIONING : The digital smoke meter (Unit Under Calibration) was preconditioning 24 hours at ambient conditions prior to calibration being performed.

CALIBRATION RESULTS:

Table 1: The results of digital smoke meter calibration are reported in the table below.

Stated value of the neutral density verification filter ¹ (%)	Digital smoke meter reading ² (%)	Error (%)
30.40	30.1	0.3
30.40	30.3	0.1
30.40	30.4	0.0

Remark:

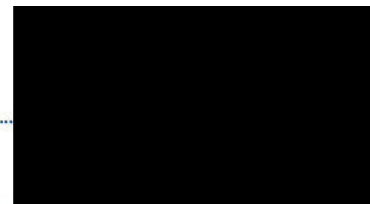
- (1) Three measurement readings were taken, 5 inch pipe diameter was selected with the system configured to operate at power more than 300 horsepower.
 (2) The specified accuracy of standard neutral density verification filters is ±1%.

Calibrated by:

- ☒ Mr. Sorawit Thachalad
☐ Miss Jitraporn Lertsomphol



Approved signatory:



Remark:

- ¹ The percent opacity of the standard neutral density filters is specified and certified by the manufacturer.
² The measurement reading of Unit Under Calibration (Digital smoke meter).



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 9 February, 2026

Certification No. 082/26

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : Sensor : NRG
Basic Datalogger : Symphonie

Type : Sensor : #40C Basic Datalogger : LR20

Serial No. : Sensor : 1795-00148570 Basic Datalogger : 428000467

Customer : TOPS-LAB Consultants Co.,Ltd.
189 Moo 3, Bang Rak Phatthana, Bang Bua Thong,
Nonthaburi 11110.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1014.5 hPa

NATIONAL STANDARD WIND TUNNEL :

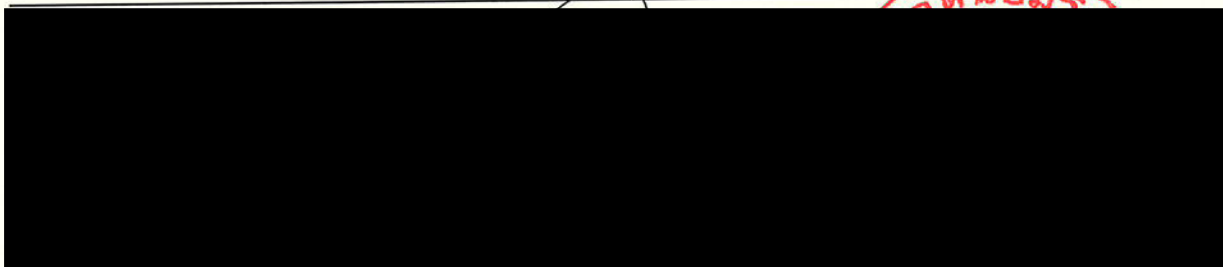
: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119

: 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





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

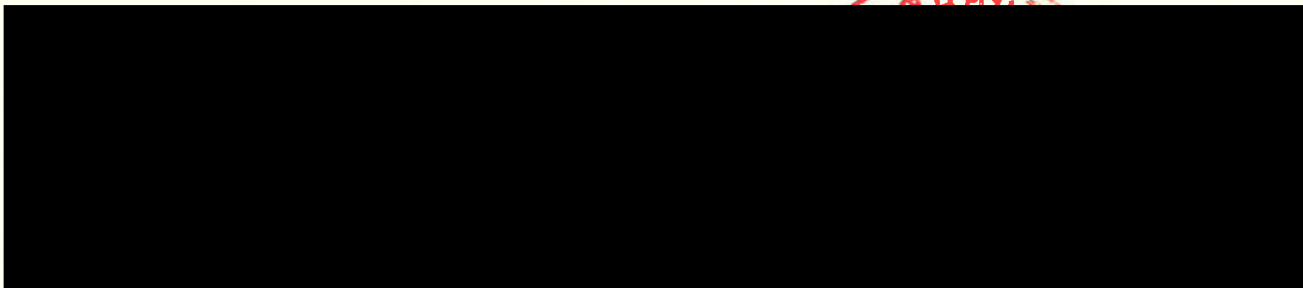
Certification No. 082/26

9 February, 2026

Page : 2 of 2

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H2O	Vacumm inches H2O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.96	0.04
3.02	-	-	-	3.12	-0.10
5.00	-	-	-	4.95	0.05
7.04	-	-	-	7.11	-0.07
9.02	-	-	-	8.98	0.04
11.01	-	-	-	11.13	-0.12
13.01	-	-	-	12.99	0.02
15.01	-	-	-	15.09	-0.08
17.02	-	-	-	17.00	0.02
20.02	-	-	-	20.11	-0.09

Vane Angel Bench Stand Model 18112	
Young Meteorological Instruments	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	182
270	272





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 9 February, 2026

Certification No. 081/26

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : Sensor : NRG
Basic Datalogger : Symphonie

Type : Sensor : #40C Basic Datalogger : LR20

Serial No. : Sensor : 1795-00148579 Basic Datalogger : 428005316

Customer : TOPS-LAB Consultants Co.,Ltd.
189 Moo 3, Bang Rak Phatthana, Bang Bua Thong,
Nonthaburi 11110.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1014.0 hPa

NATIONAL STANDARD WIND TUNNEL :

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119

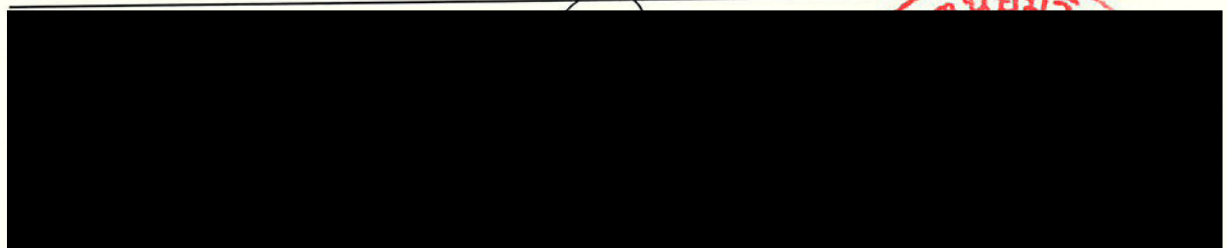
: HOOK GAGE NO 1425 Pitot Tube Theodor Friedrichs Type 0800.0000 serial 9023

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





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

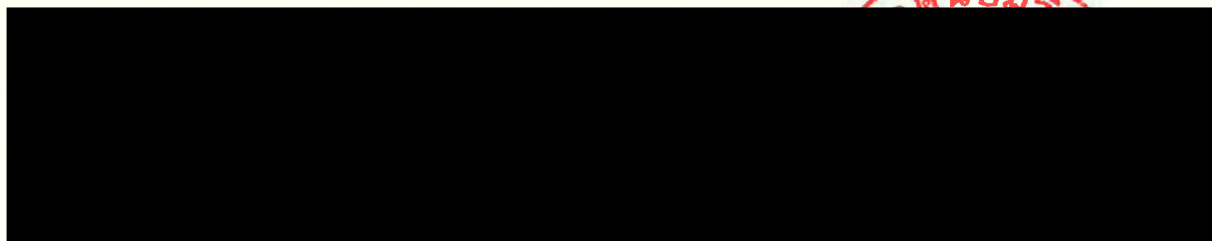
Certification No. 081/26

9 February, 2026

Page : 2 of 2

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H2O	Vacuum inches H2O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.98	0.02
3.02	-	-	-	3.04	-0.02
5.00	-	-	-	4.99	0.01
7.04	-	-	-	7.05	-0.01
9.02	-	-	-	9.05	-0.03
11.01	-	-	-	10.98	0.03
13.01	-	-	-	13.04	-0.03
15.01	-	-	-	14.97	0.04
17.02	-	-	-	17.06	-0.04
20.02	-	-	-	19.98	0.04

Vane Angel Bench Stand Model 18112	
Young Meteorological Instruments	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	91
180	180
270	271





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 9 February, 2026

Certification No. 084/26

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard III Product No. 7425

Serial No. : WE51121A29A

Customer : TOPS-LAB Consultants Co.,Ltd.
189 Moo 3, Bang Rak Phatthana, Bang Bua Thong,
Nonthaburi 11110.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1014.8 hPa

NATIONAL STANDARD WIND TUNNEL :

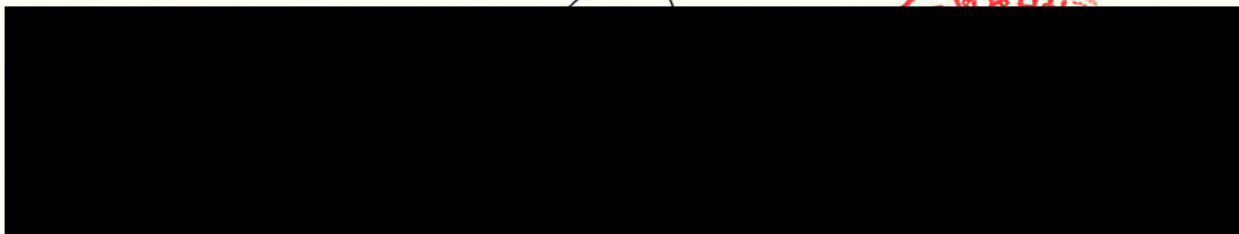
: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119

: 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





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

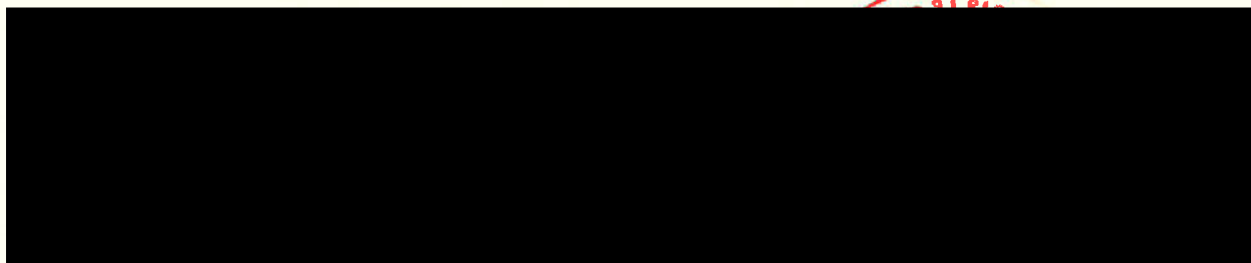
Certification No. 084/26

9 February, 2026

Page : 2 of 2

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H2O	Vacumm inches H2O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.9	0.10
7.04	-	-	-	6.7	0.34
9.02	-	-	-	8.9	0.12
11.01	-	-	-	11.0	0.01
13.01	-	-	-	12.9	0.11
15.01	-	-	-	15.0	0.01
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.0	0.02

Vane Angel Bench Stand Model 18112 Young Meteorological Instruments	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270





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 9 February, 2026

Certification No. 083/26

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard III Product No. 7425

Serial No. : WE61121A68A

Customer : TOPS-LAB Consultants Co.,Ltd.
189 Moo 3, Bang Rak Phatthana, Bang Bua Thong,
Nonthaburi 11110.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1014.6 hPa

NATIONAL STANDARD WIND TUNNEL :

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119

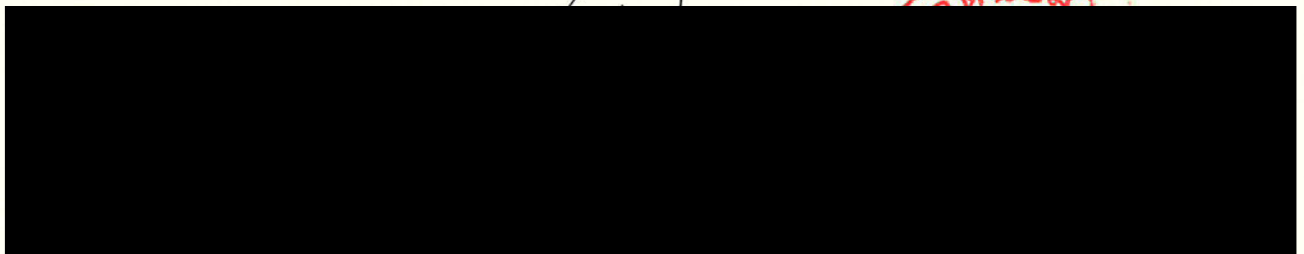
: HOOK GAGE NO 1425 Pitot Tube Theodor Friedrichs Type 0800.0000 serial 9023

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





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 083/26

9 February, 2026

Page : 2 of 2

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H2O	Vacumm inches H2O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.9	0.10
7.04	-	-	-	6.7	0.34
9.02	-	-	-	8.9	0.12
11.01	-	-	-	11.0	0.01
13.01	-	-	-	12.9	0.11
15.01	-	-	-	15.0	0.01
17.02	-	-	-	16.9	0.12
20.02	-	-	-	20.1	-0.08

Vane Angel Bench Stand Model 18112 Young Meteorological Instruments	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270



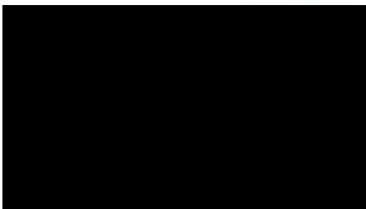
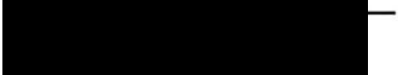
TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL.0-2717-3000-29 FAX.0-2719-9484



Certificate of Calibration

Cert.No.: 26CH318

Page.: 1 of 3

Equipment :	pH Meter
Manufacturer :	Mettler Toledo
Model :	SevenCompact S220
Serial No. :	B635935610
ID No. :	TLC-L067
Condition As-Received:	Used Item
Received Date :	10 March 2026
Calibration Date :	18 March 2026
Reference :	2603-0279DN-1
Submitted by :	Tops-Lab Consultants Co.,Ltd. 189 Moo. 3, Bangrakphatthana, Bangbuathong, Nonthaburi 11110
Ambient Temperature :	(25 ± 2.5) °C
Relative Humidity :	(50 ± 15) %
Calibration Procedure :	In - house method : - CP-CH5 by direct measurement with DC voltage standard and direct measurement with certified reference material (CRM) - CP-CH8 by comparison with temperature standard
Calibrated by :	
Approved by :	
() Chakrit Waewwanjua	
() Ponpan Paipim	
(✓) Saithip Meangmai	
Issue Date :	18 March 2026

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written
Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.



Cert.No.: 26CH318

Page.: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument

<u>Instrument</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Document Process Calibrator	54030049	130RC116	25E2743	25 Aug 2026
2) Ref. Standard Thermometer	4982054	110RC044	25I708	03 July 2026

- This measurement result is traceable to SI through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

<u>Buffer Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. date</u>
pH 4.008	CPA chem	1187328	18 Jan 2028
pH 6.979	CPA chem	1187330	18 Jan 2027
pH 10.010	CPA chem	1187332	18 Jan 2027

3. This certificate is valid only to the item calibrated on date and place of calibration.

Calibration Results

Function : mV Measurement

Performing standard curve by Document Process Calibrator at pH (4,7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor <i>k</i>
	pH	mV	mV	pH		
pH Meter S/N.: B635935610	4.000	177.48	177.4	4.000	0.058	2.00
	7.000	0.00	0.0	7.000	0.058	2.00
	10.000	-177.48	-177.4	10.000	0.058	2.00



Cert.No.: 26CH318

Page.: 3 of 3

Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement ($\pm$)	Coverage factor k
pH Electrode S/N.: 6455014	4.008	4.006	173.4	0.0044	2.00
	6.979	6.981	-0.4	0.0084	2.00
	10.010	10.011	-176.1	0.0065	2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : InLab Expert Pro-ISM
- Serial No. : 6455014

Dimension of probe

- Length : 120 mm.
- Diameter : 12 mm.
- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement ($\pm$ °C)	Coverage factor k
23.0	23.001	23.0	-0.001	0.13	2.00
25.0	25.001	25.0	-0.001	0.13	2.00
27.0	27.001	27.0	-0.001	0.13	2.00

Remark - UUC* = Unit Under Calibration

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

-o0o-

Certificate of Calibration

Certificate No. : 69-400212-1

Page : 1 of 2

Submitted by : Tops-Lab Consultants Co., Ltd.
189 Moo 3 Bangrakphatthana, Bangbuathong, Nonthaburi 11110

Equipment : Temperature Indicator with TC Probe Type K (Pocket)
Temperature Indicator
Manufacturer : Exttech Model : 39240
Range : -40 °C to 200 °C Resolution : 0.1 °C
Serial No. : PONPE5873768 ID No. : TLC-L129

Environment : Ambient Temperature : (23 ± 2) °C
Relative Humidity : (50 ± 15) %
Line Voltage : (220 ± 22) VAC

Date of Received : 18 April 2026

Date of Calibration : 21 April 2026

Date of Issue : 21 April 2026

Calibrated by : Chortip Samchusri

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4003 by compared with PRT in the liquid bath at the constant controlled temperature.

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units

1. Platinum Resistance Thermometer (PRT)

ID No.	Cert. No.	Due Date	Traceability
400001	TT-1004-26	23 Feb 2028	National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No.	Cert. No.	Due Date	Traceability
400003	25E1656	22 May 2027	National Institute of Metrology Thailand (NIMT)
400004	25E1656	22 May 2027	National Institute of Metrology Thailand (NIMT)

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full except with the prior written approval of the Calibratech Co.,Ltd.



Certificate of Calibration

Certificate No. : 69-400212-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
130	30.0023	30.0	0.0	0.22
130	40.0031	40.0	0.0	0.22

Remark

UUC : Unit Under Calibration

This result of calibration was found accurate as shown on date and place of calibration only.

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

- ๐0๐ -





CALIBRATION CERTIFICATE

Date of Issue Jul 03, 2026

Cert No. 26/2375

Order No. 26060376

Customer Tops-Lab Consultants Co., Ltd.
189 moo 3, Bangrakphatthana, Bangbuathong, Nonthaburi 11110

Place of Calibration Laboratory (Hot Room), 2nd Floor

Description Hot Air Oven

Model UF55

Serial No. B214.0908

ID.No. TLC-L029

Date of Receipt Jul 07, 2026

Date of Calibration Jul 07, 2026

Environment

Temperature	(Min)	27.7	°C	(Max)	30.0	°C
Relative Humidity	(Min)	53.4	%rh	(Max)	61.9	%rh

Calibration Method

- This calibration was performed using work instruction No. WI-17 which based on AS2853:1986.
- The Temperature Scale in use at this laboratory is The International Temperature Scale of 1990 (ITS-90).
- The measurement is traceable to The International System of Units (SI).

Standard Equipment	Serial No.	Certificate No.	Due Date
1) Data Acquisition Switch Unit with Sensor	MY59002130	QR26-0457	09 Feb 2027



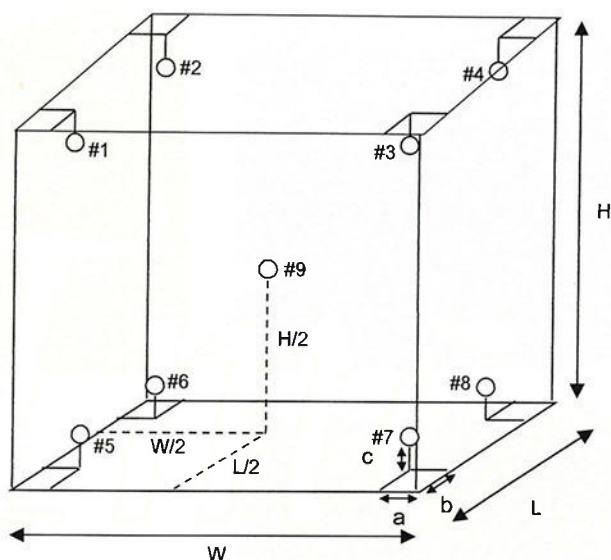
CALIBRATION CERTIFICATE

Date of Issue Jul 03, 2026

Cert No. 26/2375

Order No. 26060376

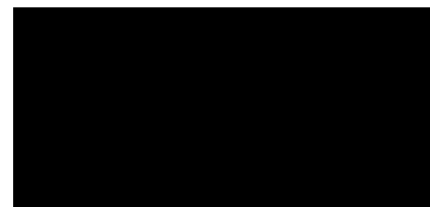
Results (without adjustment)



Position of reference thermometers were placed

Note.

- 1). Dimension (W x L x H) is 40 cm x 33 cm x 40 cm
- 2). Stability - greatest one half of difference between max peak and min peak of each reference probe measured temperature obtained during the calibration interval.
- 3). Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady state conditions. The reference sensor should preferably be located at the geometric center of the chamber.





CALIBRATION CERTIFICATE

Date of Issue Jul 03, 2026

Cert No. 26/2375

Order No. 26060376

Results (without adjustment)

Cal Point (°C)	UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability $\pm$ (°C)	Uniformity (°C)	Uncertainty $\pm$ (°C)
104.0	104.0	104.0	Position 1	103.954	0.113	0.166	0.32
			Position 2	103.913			
			Position 3	103.973			
			Position 4	103.990			
			Position 5	103.892			
			Position 6	103.819			
			Position 7	103.968			
			Position 8	103.951			
			Position 9	103.967			

Cal Point (°C)	UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability $\pm$ (°C)	Uniformity (°C)	Uncertainty $\pm$ (°C)
180.0	180.0	180.0	Position 1	180.093	0.220	1.226	0.48
			Position 2	179.956			
			Position 3	180.064			
			Position 4	180.173			
			Position 5	180.034			
			Position 6	179.841			
			Position 7	179.197			
			Position 8	179.898			
			Position 9	180.223			



CALIBRATION CERTIFICATE

Date of Issue Jul 03, 2026

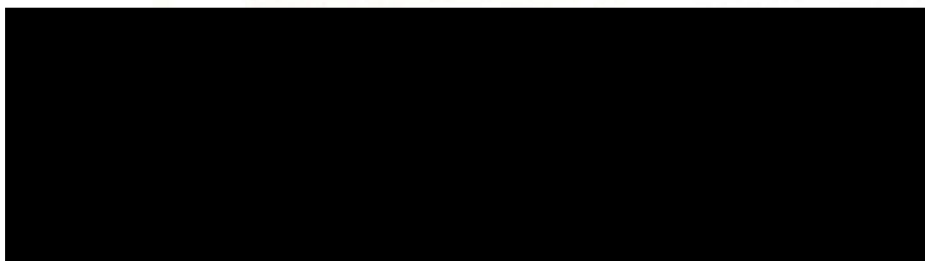
Cert No. 26/2375

Order No. 26060376

The stability and uniformity were taken into account in the measurement uncertainty stated.

The above results are valid exclusively for calibration samples as mentioned in this report.

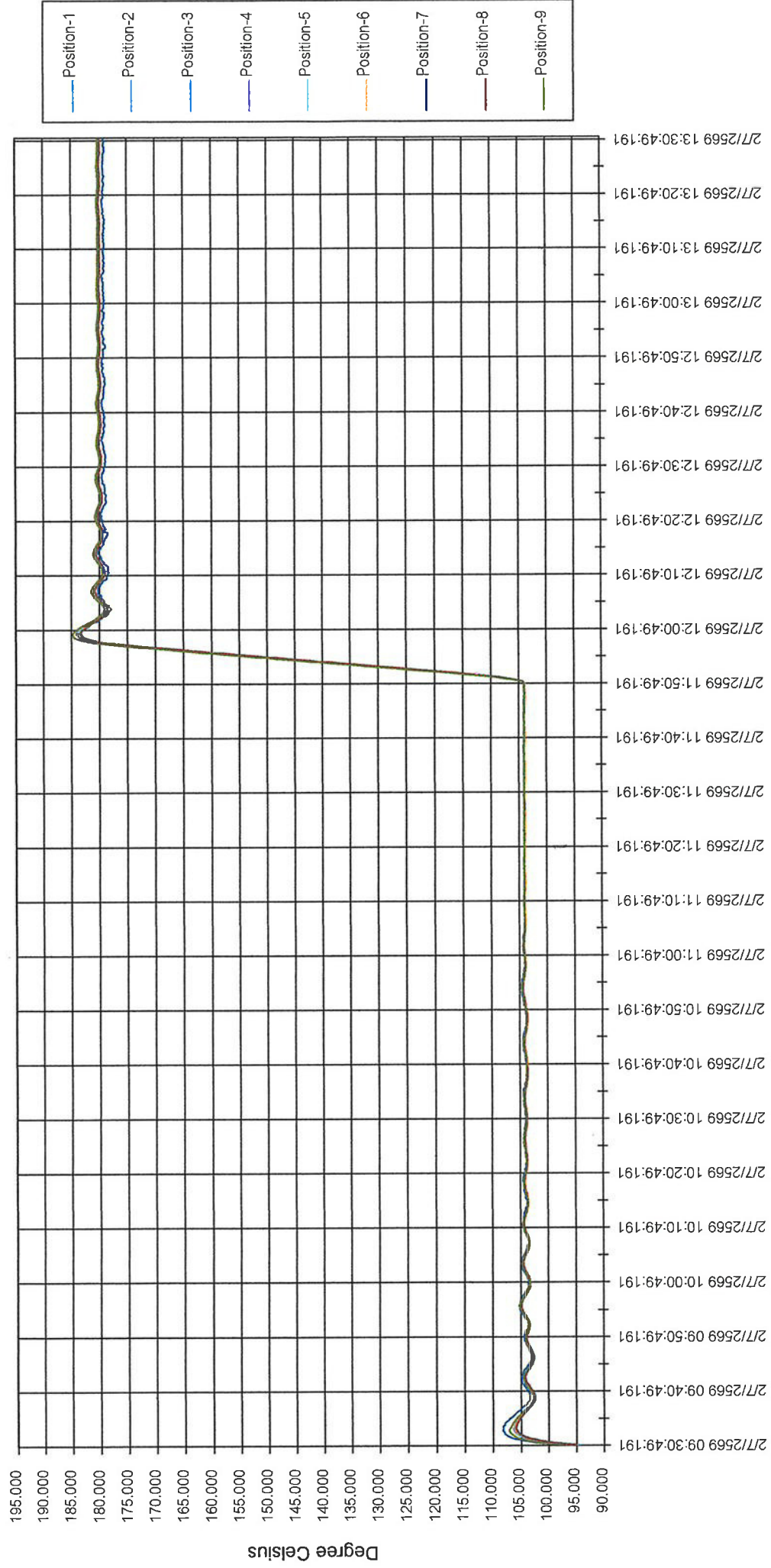
This reported expanded uncertainty was based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with ONAC requirements.



Hot Air Oven

Cert.No. 26/2375

Model. UF55 S/N. B214.0908 ID.No. TLC-L029



Times

Certificate of Calibration

Certificate No. : 69-400189-4

Page : 1 of 2

Submitted by : Tops-Lab Consultants Co., Ltd.
189 Moo 3 Bangrakphatthana, Bangbuathong, Nonthaburi 11110

Equipment : Water Bath
Manufacturer : Memmert Model : WNB 14
Range : N/A °C Resolution : 0.1 °C
Serial No. : L410.1294 ID No. : TLC-L009

Environment : On site calibration was carried out at the Laboratory, Tops-Lab Consultants Co., Ltd.
Ambient Temperature : (33.4 to 36.2) °C
Relative Humidity : (45 to 53) %
Line Voltage : (220.0 to 228.0) V

Date of Received : 16 April 2026

Date of Calibration : 16 April 2026

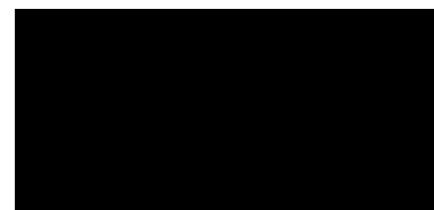
Date of Issue : 17 April 2026

Calibrated by : Aphisorn Worawasukullaya

Calibration Method : This instrument was calibrated by In-house method CAL-M4006 based on ASTM E715-80
The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units
Standard Digital Thermometer with RTD probe

ID No.	Cert. No.	Due Date	Traceability
400046 & 400024	69-400119-2	25 Sep 2026	National Institute of Metrology Thailand (NIMT)



Supervisor

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full except with the prior written approval of the Calibratech Co.,Ltd.



Certificate of Calibration

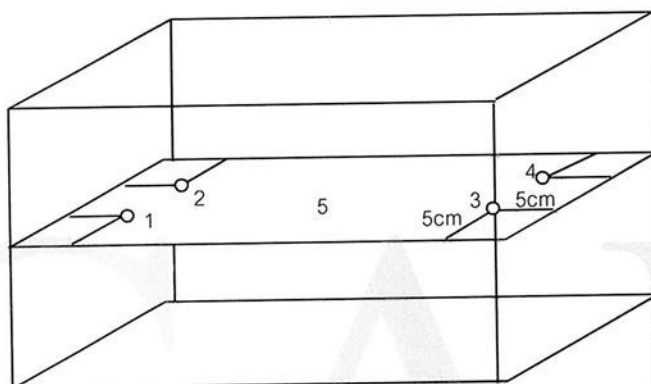
Certificate No. : 69-400189-4

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Front

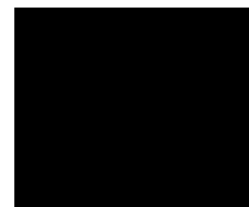
Test Point (° C)	Setting Temperature (° C)	Indicating Temperature (° C)	Measured Temperature (° C) @ Sensor					Uncertainty (± ° C)	Measured Uniformity (° C)	Measured Stability (° C)
			No.							
			1	2	3	4	5			
85.0	73.3	73.3	85.13	85.02	85.07	84.99	85.11	0.20	0.22	0.08
95.0	83.3	83.3	95.10	95.23	95.19	95.12	95.21	0.22	0.21	0.11

Remark The uncertainty is not combine uniformity of the water bath

This result of calibration was found accurate as shown on date and place of calibration only.

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

- o0o -



www.calibratech.co.th

Certificate of Calibration

Certificate No. : 69-200139-1

Page : 1 of 2

Submitted by : Tops-Lab Consultants Co.,Ltd.
189 Moo 3, Bangrakphatthana, Bangbuathong, Nonthaburi 11110

Equipment : Electronic Balance
Manufacturer : METTLER TOLEDO Model : MS205DU
Serial No. : B420605448 ID No. : TLC-L038
Capacity : 220 g Resolution : 0.00001g/82g, 0.0001g/220g

Environment : On site calibration was carried out at the Laboratory, Tops-Lab Consultants Co.,Ltd.
Ambient Temperature : (29.5 to 29.8) °C
Relative Humidity : (32.3 to 33.4) %
Air Pressure : 1007.0 mbar

Date of Received : 16 April 2026

Date of Calibration : 16 April 2026

Date of Issue : 17 April 2026

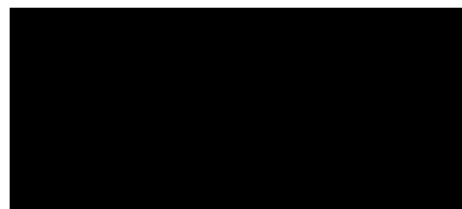
Calibrated by : Akaradath Thippichai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14
Edition 7 - November 2022

Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02251973	07 Nov 2026	National Institute of Metrology (Thailand), (NIMT)



Supervisor

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full except with the prior written approval of the Calibratech Co.,Ltd.



Certificate of Calibration

Certificate No. : 69-200139-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

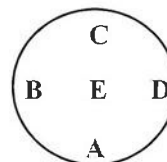
Nominal Value (g)	Correction (g)	Uncertainty $\pm$ (g)
0.1	0.00001	0.000018
0.2	0.00001	0.000020
0.5	0.00001	0.000023
1	0.00001	0.000026
2	0.00001	0.000034
5	0.00000	0.000043
10	0.00000	0.000053
20	-0.00002	0.000071
50	0.00001	0.00011
100	0.0001	0.00020
200	0.0003	0.00038

This result of calibration was found accurate as shown on date and place of calibration only.

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.09$, providing a level of confidence of approximately 95%

Eccentric error

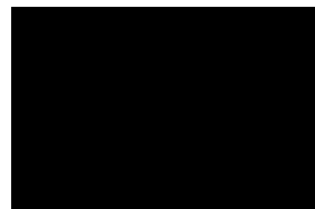
Load test : 50 g
 A B C D E
 0.00003 0.00005 -0.00005 0.00001 0.00000 g



Repeatability

Load test : 200 g
 Stdev. : 0.000000 g

- o0o -



Certificate of Calibration

Certificate No. : 69-400189-9 **Page : 1 of 2**

Submitted by : Tops-Lab Consultants Co., Ltd.
189 Moo 3 Bangrakphatthana, Bangbuathong, Nonthaburi 11110

Equipment : Temperature controlled enclosure (Incubator)

Manufacturer : Memmert	Model : IF55
Range : N/A °C	Resolution : 0.1 °C
Serial No. : D216.1299	ID No. : TLC-L069

Environment : On site calibration was carried out at the Laboratory, Tops-Lab Consultants Co., Ltd.

Ambient Temperature : (22.7 to 23.8) °C

Relative Humidity : (39 to 45) %

Line Voltage : (220.0 to 228.0) V

Date of Received : 16 April 2026

Date of Calibration : 16 April 2026

Date of Issue : 17 April 2026

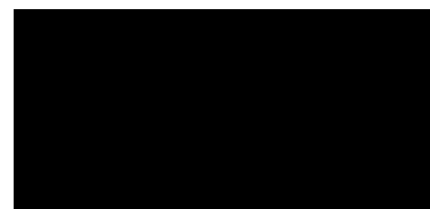
Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units
Standard Digital Thermometer with RTD Probe

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
400029 & 400043	68-400566-1	30 Apr 2026	National Institute of Metrology Thailand (NIMT)



Supervisor

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full except with the prior written approval of the Calibratech Co.,Ltd.



Certificate of Calibration

Certificate No. : 69-400189-9

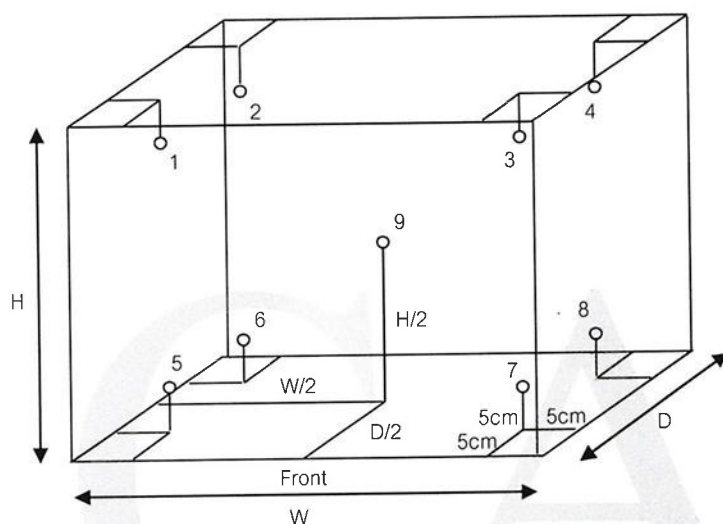
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber

W = 0.40 m

D = 0.33 m

H = 0.41 m

Capacity = 0.05 m³

Test Point (° C)	Setting Temperature (° C)	Indicating Temperature (° C)	Measured Temperature (° C) @ Sensor No.									Uncertainty (± ° C)
			1	2	3	4	5	6	7	8	9	
35.0	35.0	35.0	35.04	35.06	35.08	35.08	35.08	35.04	34.91	35.02	35.05	0.30
44.5	44.5	44.5	44.55	44.55	44.61	44.59	44.59	44.52	44.36	44.55	44.57	0.30

Test Point (° C)	Setting Temperature (° C)	Indicating Temperature (° C)	Measured Uniformity (° C)	Measured Stability (° C)	Overall Variation (° C)
35.0	35.0	35.0	0.17	0.02	0.22
44.5	44.5	44.5	0.23	0.02	0.28

Remark The uncertainty is not combine uniformity of the air chamber

This result of calibration was found accurate as shown on date and place of calibration only.

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

- o0o -



Certificate of Calibration

Certificate No. : 69-400189-10

Page : 1 of 2

Submitted by : Tops-Lab Consultants Co., Ltd.
189 Moo 3 Bangrakphatthana, Bangbuathong, Nonthaburi 11110

Equipment : Autoclave
Manufacturer : Zealway Model : GI54TW
Range : N/A °C Resolution 0.1 °C
Serial No. : A515D096 ID No. : TLC-L081

Environment : On site calibration was carried out at the Laboratory, Tops-Lab Consultants Co., Ltd.
Ambient Temperature : (32.4 to 35.2) °C
Relative Humidity : (45 to 53) %
Line Voltage : (220.0 to 228.0) V

Date of Received : 17 April 2026

Date of Calibration : 17 April 2026

Date of Issue : 17 April 2026

Calibrated by : Permpon Chanpu

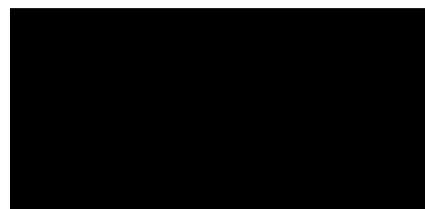
Calibration Method : This instrument was calibrated by In-house method CAL-M4007 based on
BS 2646 Part 1 : 2021

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Temperature Data Logger with RTD pt 100

ID No.	Cert. No.	Due Date	Traceability
400039	68-400670-1	23 Jun 2026	National Institute of Metrology Thailand (NIMT)
400040	68-400670-2	23 Jun 2026	National Institute of Metrology Thailand (NIMT)
400041	68-400670-3	23 Jun 2026	National Institute of Metrology Thailand (NIMT)



(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full except with the prior written approval of the Calibratech Co.,Ltd.



Certificate of Calibration

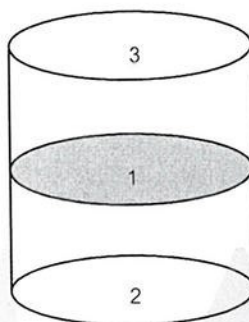
Certificate No. 69-400189-10

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Test Point (° C)	Setting Temperature (° C)	Indicating Temperature (° C)	Measured Temperature (° C) @ Sensor No.			Uncertainty (± ° C)	Measured Uniformity (° C)	Measured Stability (° C)	Sterilizing Time (minute)	Pressure Gauge Reading (MPa)
			1	2	3					
121.0	121.0	121.0	121.8	121.8	121.9	0.71	0.2	0.1	15	0.11

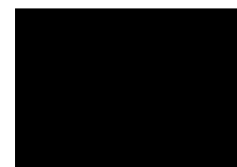
Remark

1. UUC : Unit Under Calibration
2. Pressure Gauge reading are out of accreditation's scope.

This result of calibration was found accurate as shown on date and place of calibration only.

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

- o0o -



Certificate of System Qualification

ES-OQ

System ID: MY15350005
Organization Name: TOP-LAB Consultants CO.,LTD.
Organization Location: 189 Moo 3 T.Bangrakphatthana A.Bangbuathong Nontaburi 11110

Date: November 17, 2025 1:10:15 PM
EQP Name: AgilentRecommended

EQP Revision: ES.02.51
Overall Qualification Status: Pass

CDS Logon Verification

Logon:

Overall CDS Logon Verification Test Status

Preparation

Instrument Tests

Autosampler Operation

Date: November 17, 2025 1:10:15 PM
System ID: MY15350005

Instrument Details

Purpose

This section describes the as found system configuration.

Details

Spectrometer 1

Manufacturer	Agilent Technologies
Name	5100 VDV
Model Number	G8011A
Sample Introduction	Double pass glass cyclonic spraychamber and seaspray nebulizer
Serial Number	MY15350005
Firmware Revision	3442

Chiller 1

Manufacturer	Agilent Technologies
Name	Chiller
Model Number	G8481A
Serial Number	1A15500418

Autosampler 1

Manufacturer	Agilent Technologies
Name	SPS4
Model Number	G8410A
Serial Number	AU15210226

Vapor Generator 1

Manufacturer	Agilent Technologies
Name	VGA77P
Model Number	G8475A
Serial Number	MY17040001

Electronic Signature

Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and logon to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

Details

Full Name of Signer:	Suwan Onkhom
Logged On User Name:	suwan.onkhom@non.agilent.com
Signature Creation Date:	November 17, 2025
Reason for Signature:	Executed protocol and published this original version of document

ACE Self Qualification Status

The installed version of ACE used to deliver this service passed qualification; the results conform with expected values. The self qualification summary report is available in the session folder location SDS\ClearStore\AceSelfQualification.

Regulatory Disclaimer

This document provides a protocol to verify and record instrument configuration and evidence of proper operation. It has been prepared from our interpretation of applicable regulations as well as industry best practices. The document is designed to provide an important component of a complete compliance package. Validation depends upon many factors and use of this protocol alone does not assure compliance. Agilent Technologies makes no promises or representations as to its sufficiency for any specific regulatory program.

Warranty

Agilent Technologies makes no warranty of any kind to this material, including but not limited to, the implied warranties or merchantability and fitness for a particular purpose. Agilent Technologies shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

User Name: suwan.onkhom

System Id: MY15350005

Report Generated by Hostname: DESKTOP-GIFC9N6

Print Date: November 17, 2025 1:10:19 PM

PMOQ_IO_TLC_6007991924_20251117 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 17, 2025 9:30:05 AM	Audit	SessionCreated	Session	Host Name: DESKTOP-GIFC9N6, Drive Serial Number: 7AA6157A
November 17, 2025 9:30:05 AM	start	Configuration	Session	None
November 17, 2025 9:30:05 AM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
November 17, 2025 9:31:12 AM	Audit	EqpLoaded	Session	EQP details for primary technique [Es] - File path: [ProtocolPacks/Es/Configurati ons/02.51/Es.02.51.eqp], EQP File Name: [Es.02.51.eqp], EQP Name: [AgilentRecommended],Proto col Revision :[Es.02.51]
November 17, 2025 9:31:15 AM	End	Configuration	Session	None
November 17, 2025 9:31:20 AM	start	Qualification	Session	PM
November 17, 2025 9:31:20 AM	start	Qualification	Session	OQ
November 17, 2025 9:31:20 AM	start	Execution	ES System Inspection : 5100 VDV, Chiller 1 - G8481A: ES System Inspection	None
November 17, 2025 9:31:37 AM	End	Execution	ES System Inspection : 5100 VDV, Chiller 1 - G8481A: ES System Inspection	Run Count : 1
November 17, 2025 9:31:39 AM	start	Execution	Spectrometer Maintenance : 5100 VDV, Chiller 1 - G8481A: Spectrometer Maintenance	None

User Name: suwan.onkhom

System Id: MY15350005

Report Generated by Hostname: DESKTOP-GIFC9N6

Print Date: November 17, 2025 1:10:19 PM

PMOQ_IO_TLC_6007991924_20251117 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 17, 2025 12:06:01 PM	End	Execution	Spectrometer Maintenance : 5100 VDV, Chiller 1 - G8481A: Spectrometer Maintenance	Run Count : 1
November 17, 2025 12:06:32 PM	start	Execution	Autosampler Maintenance : Autosampler 1 - SPS4: Autosampler Maintenance	None
November 17, 2025 12:06:38 PM	End	Execution	Autosampler Maintenance : Autosampler 1 - SPS4: Autosampler Maintenance	Run Count : 1
November 17, 2025 12:06:39 PM	start	Execution	Vapor Generator Maintenance : VGA77P: Vapor Generator Maintenance	None
November 17, 2025 12:10:02 PM	start	Execution	Vapor Generator Maintenance : VGA77P: Vapor Generator Maintenance	None
November 17, 2025 12:12:29 PM	End	Execution	Vapor Generator Maintenance : VGA77P: Vapor Generator Maintenance	Run Count : 1
November 17, 2025 12:15:29 PM	Audit	TestUnlocked	Vapor Generator Maintenance : VGA77P: Vapor Generator Maintenance	Deviation filed for Run Count : 1
November 17, 2025 12:15:29 PM	start	Execution	Vapor Generator Maintenance : VGA77P: Vapor Generator Maintenance	None
November 17, 2025 12:17:13 PM	End	Execution	Vapor Generator Maintenance : VGA77P: Vapor Generator Maintenance	Run Count : 2
November 17, 2025 12:17:21 PM	start	Execution	ES Service Review : 5100 VDV, Chiller 1 - G8481A: ES Service Review	None
November 17, 2025 12:17:43 PM	End	Execution	ES Service Review : 5100 VDV, Chiller 1 - G8481A: ES Service Review	Run Count : 1

Page 2 / 4

User Name: suwan.onkhom

System Id: MY15350005

Report Generated by Hostname: DESKTOP-GIFC9N6

Print Date: November 17, 2025 1:10:19 PM

PMOQ_IO_TLC_6007991924_20251117 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 17, 2025 12:17:44 PM	End	Qualification	Session	PM
November 17, 2025 12:17:44 PM	start	Qualification	Session	OQ
November 17, 2025 12:17:44 PM	start	Execution	CDS Logon Verification : Qualitative Test	None
November 17, 2025 12:58:24 PM	End	Execution	CDS Logon Verification : Qualitative Test	Run Count : 1
November 17, 2025 12:58:26 PM	start	Execution	Preparation : 5100 VDV: Qualitative Test - No setpoints associated	None
November 17, 2025 12:59:31 PM	End	Execution	Preparation : 5100 VDV: Qualitative Test - No setpoints associated	Run Count : 1
November 17, 2025 12:59:32 PM	start	Execution	Instrument Tests : 5100 VDV: Qualitative Test - No setpoints associated	None
November 17, 2025 12:59:51 PM	End	Execution	Instrument Tests : 5100 VDV: Qualitative Test - No setpoints associated	Run Count : 1
November 17, 2025 12:59:53 PM	start	Execution	Autosampler Operation : Autosampler 1 - SPS4: Qualitative Test - No setpoints associated	None
November 17, 2025 12:59:57 PM	End	Execution	Autosampler Operation : Autosampler 1 - SPS4: Qualitative Test - No setpoints associated	Run Count : 1
November 17, 2025 12:59:59 PM	End	Qualification	Session	OQ
November 17, 2025 12:59:59 PM	start	Reporting	Session	None

Page 3 / 4

User Name: suwan.onkhom

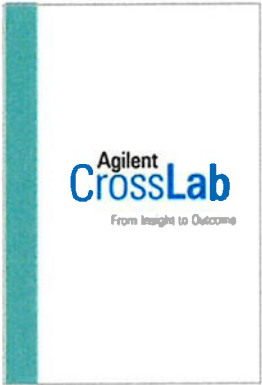
System Id: MY15350005

Report Generated by Hostname: DESKTOP-GIFC9N6

Print Date: November 17, 2025 1:10:19 PM

PMOQ_IO_TLC_6007991924_20251117 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 17, 2025 1:04:26 PM	Audit	Reporting	Session	Report Generated : Report
November 17, 2025 1:05:39 PM	Audit	Reporting	Session	Report Signed : Report PDF Name: PMOQ_IO_TLC_6007991924_20251117_20251117_PM Report_1.pdf User Name: suwan.onkhom@non.agilent.com Full Name of Signer: Suwan Onkhom Reason for signature: Executed protocol and published this original version of document
November 17, 2025 1:09:04 PM	Audit	Reporting	Session	Report Generated : Certificate
November 17, 2025 1:09:43 PM	Audit	Reporting	Session	Report Generated : Report



Agilent CrossLab Compliance

Qualification Type:	ES-OQ
System ID:	MY15350005
EQP Name:	AgilentRecommended
EQP Revision:	ES.02.51
EQP Publish Date:	June 2021
Date:	November 17, 2025 1:10:28 PM
Report Type:	Report
Org. Name:	TOP-LAB Consultants CO.,LTD.
Org. Location:	189 Moo 3 T.Bangrakphatthana A.Bangbuathong Nontaburi 11110

Table of Contents

Section	Page
Cover page	1
Table of Contents	2
Test Summary	3
Service Details	4
Instrument Details	5
Protocol Details	6
Tests	7
CDS Logon Verification	7
Preparation : 5100 VDV	8
Instrument Tests : 5100 VDV	11
Autosampler Operation : Autosampler 1 - SPS4	12
Declaration of Change Control	13
Attachments	14
Signature	28
Transaction Logs	29

Test Summary

Purpose

This section includes the Overall Qualification Status and details for each test that meets at least one of the following criteria: (1) was not scheduled; (2) was scheduled but not run; (3) was processed more than once; (4) passed recommended limits only when dual limits were selected; (5) required deviation(s) or comment(s); (6) required integration event change(s). Tests that pass and do not meet any criteria above are not included.

For a complete list of scheduled tests, see the table of contents. For supporting documentation, refer to the Attachments section.

NOTE: A Pass for the Overall Qualification Status indicates that all scheduled tests were run and passed; R, I, D, and C are blank if not applicable for that specific test.

- R: runs
- I: integration event changes
- D: number of deviations submitted
- C: number of comments submitted
- Status: NS (not scheduled); NR (scheduled but not run); NC (unlocked but not completed)

Details

Test	Status			
	R	I	D	C
There were no repeated or re-integrated tests. All test resulted in a pass status.				

Overall Qualification Status

Pass

Service Details

Purpose

This section includes local contact and delivery details for this service.

General Details

Service Order No./Request: 6007991924
EQP Name: AgilentRecommended
EQP Revision: ES.02.51
Report Type: Report

Organization Details

Name: TOP-LAB Consultants CO.,LTD.
Location: 189 Moo 3 T.Bangrakphatthana A.Bangbuathong Nontaburi 11110

Local Contact Details

Name: Khun Manipa Butsee
Job Title: Lab Manager
Qualification Location: ICP Room

Operator Details

Name: Suwan Onkhom
Job Title: Field Service Engineer

Data Acquisition Details

Acquisition Software Name: ICP Expert
Acquisition Software Revision: 7.3.1.9507
Customer Data System (CDS): Es: ICP Expert

Instrument Details

Purpose

This section describes the as found system configuration.

Details

Spectrometer 1

Manufacturer	Agilent Technologies
Name	5100 VDV
Model Number	G8011A
Sample Introduction	Double pass glass cyclonic spraychamber and seaspray nebulizer
Serial Number	MY15350005
Firmware Revision	3442

Chiller 1

Manufacturer	Agilent Technologies
Name	Chiller
Model Number	G8481A
Serial Number	1A15500418

Autosampler 1

Manufacturer	Agilent Technologies
Name	SPS4
Model Number	G8410A
Serial Number	AU15210226

Vapor Generator 1

Manufacturer	Agilent Technologies
Name	VGA77P
Model Number	G8475A
Serial Number	MY17040001

Protocol Details

Purpose

This section lists the revisions for all test units used in this report. For complete test-specific and high-level change details, refer to the Revision History document.

Test Revision	Test
ES.02.50	Autosampler Operation
ES.02.51	CDS Logon Verification
ES.02.50	Instrument Tests
ES.02.50	Preparation

CDS Logon Verification

Purpose

This test provides evidence of the logon used to collect qualification data.

Logon:

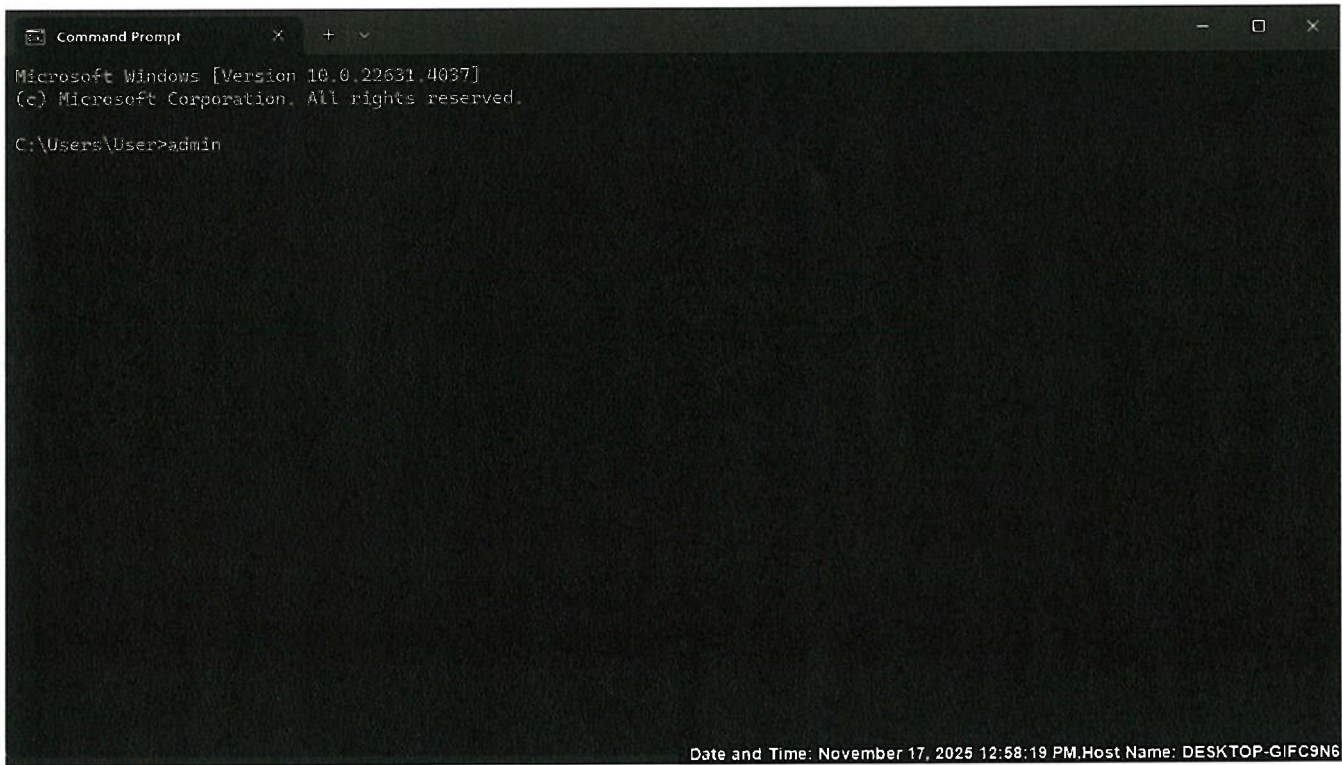
Results

Criteria	Observed Result	Expected Result	Status
Was the capture done?	Yes	Yes	Pass

Status: Runs:

Test Evidence

Image Details: CDS Logon
Date and Time: November 17, 2025 12:58:19 PM
Host Name: DESKTOP-GIFC9N6



Overall CDS Logon Verification Test Status

Preparation

Purpose

This test records a status for each preparation task for the Agilent ICP-OES.

Configuration Details

Model/Serial No.:	G8011A	MY15350005
-------------------	--------	------------

Results

Criteria	Observed Result	Expected Result	Status
Does the plasma ignite successfully in the first three attempts?	Yes	Yes	Pass
Was the detector calibration performed and completed successfully?	Yes	Yes	Pass
Was the instrument calibration performed and completed successfully?	Yes	Yes	Pass

Test Evidence

Image Details: Was the detector calibration performed and completed successfully?

Date and Time: November 17, 2025 12:59:08 PM

Host Name: DESKTOP-GIFC9N6

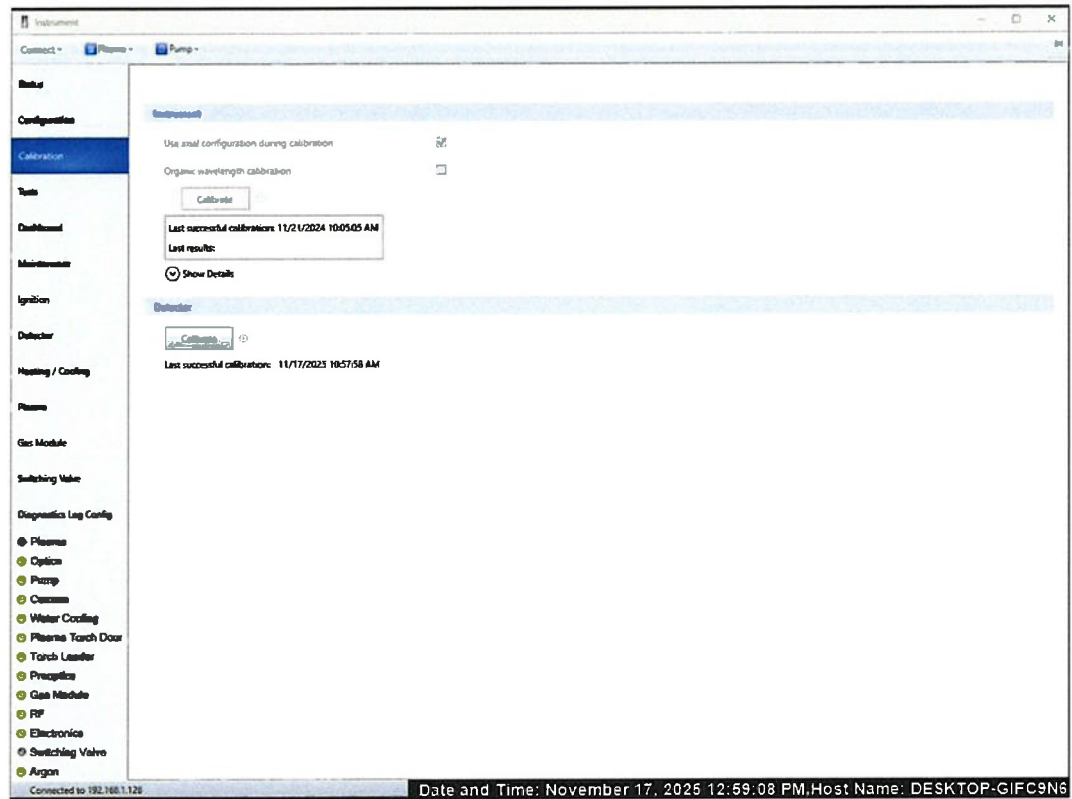


Image Details: Was the instrument calibration performed and completed successfully?

Date and Time: November 17, 2025 12:59:28 PM

Host Name: DESKTOP-GIFC9N6

Instrument

Connect - Plasma - Pump -

Status

Configuration

Calibration

Tests

Dashboard

Maintenance

Ignition

Detector

Heating / Cooling

Plasma

Gas Module

Switching Valve

Diagnostics Log Config

Plasma

Optics

Pump

Camera

Water Cooling

Plasma Torch Door

Torch Loader

Preoptics

Gas Module

RF

Electronics

Switching Valve

Argon

Use asil configuration during calibration ☒

Organic wavelength calibration ☐

Calibrate

Last successful calibration: 11/17/2025 11:21:15 AM

Last results: Pass

Show Details

Wavelength (36/36)

Element	Wavelength (nm)	Wavelength Error (nm)	Result
Al	167.019	0.006156	✓
N	174.213	0.004974	✓
As	188.98	-0.001157	✓
C	193.027	-0.003981	✓
As	193.996	-0.000115	✓
Se	196.025	0.000084	✓
Mo	202.032	0.000157	✓
Zn	202.548	-0.003665	✓
Mo	203.846	0.001871	✓
Mo	204.598	0.000647	✓
Cr	205.56	-0.001892	✓
Zn	213.857	-0.003746	✓
Cd	214.439	-0.004262	✓
Pb	220.353	-0.004030	✓
Ni	221.648	-0.000384	✓
Cd	226.502	-0.000412	✓
Co	228.615	-0.001823	✓
Ni	232.003	-0.000798	✓
Be	233.527	-0.000384	✓
Co	237.863	-0.000291	✓
Co	238.892	-0.000003	✓
Mn	257.61	-0.001672	✓
Co	258.722	-0.001385	✓
Mn	259.372	-0.001720	✓
Mn	260.568	0.002081	✓
Mn	293.331	0.000424	✓
Mn	294.921	0.000136	✓
Cu	324.754	0.000493	✓
Cu	327.395	-0.003607	✓
Sr	338.071	0.007177	✓
Cr	357.868	-0.000837	✓
Al	396.152	-0.000167	✓
Be	455.403	0.001584	✓
Be	493.408	0.002361	✓
Be	514.171	0.000718	✓
K	766.481	0.003723	✓

Detector

Calibrate

Last successful calibration: 11/17/2025 10:57:58 AM

Connected to 192.168.0.228

Date and Time: November 17, 2025 12:59:28 PM, Host Name: DESKTOP-GIFC9N6

Overall Test Status

Pass

Runs: 1

Date: November 17, 2025 1:10:28 PM
System ID: MY15350005

Instrument Tests

Purpose

This test records a status for each of the automated tests within the Agilent ICP-OES CDS. For detailed test criteria, refer to the attached report.

Configuration Details

Model/Serial No.:	G8011A	MY15350005
-------------------	--------	------------

Results

Observed Result Expected Result Status

Are the Functional Tests results within acceptance criteria?



Subsystem Communications

Yes	Yes	Pass
-----	-----	------

Air Flow

Yes	Yes	Pass
-----	-----	------

Water Flow

Yes	Yes	Pass
-----	-----	------

Gas Flows

Yes	Yes	Pass
-----	-----	------

RF Generator

Yes	Yes	Pass
-----	-----	------

Camera

Yes	Yes	Pass
-----	-----	------

Optics

Yes	Yes	Pass
-----	-----	------



Are the Instrument Performance Tests results within acceptance criteria?

Resolution

Yes	Yes	Pass
-----	-----	------

Sensitivity

Yes	Yes	Pass
-----	-----	------

Precision

Yes	Yes	Pass
-----	-----	------

Overall Test Status

Pass	Runs: 1
------	---------

Autosampler Operation

Purpose

This test verifies that the autosampler operates properly.

Configuration Details

Model/Serial No.:	G8410A	AU15210226
-------------------	--------	------------

Results

Criteria	Observed Result	Expected Result	Status
Does the autosampler successfully move to the specified location(s)?	Yes	Yes	Pass

Overall Test Status

Pass	Runs: 1
------	---------

Declaration of Change Control

This document is under change control. Revision history is maintained and printed on each document. Access to the master documents is limited to process owners. Documents receive periodic review and cannot be assigned an evergreen status.

The qualification performed according to this document refers only to the hardware/software configuration in place at the time of the qualification. Agilent Technologies recommends that instrument configuration change management procedures be in place in order to maintain the validation process. Any changes to the analytical or computer hardware or software must be clearly specified.

A change management system provides a means for determining the degree of requalification required according to the extent of the changes made. All details of the changes must be thoroughly recorded and documented, together with details of completed tests and their results.

Note: Hardware/software configuration management is the customer's responsibility.

Attachments

Training requirements note: The delivery engineer attaches an ACE technique-specific training certificate to the Equipment Qualification Report (EQR). Obtaining ACE technique-specific certification includes pre-requisite trainings for Data Integrity, General Compliance topics (GMP, GLP, ALCOA, etc.), instrument hardware and software components, and the ACE technique itself. The one certificate encompasses all pre-requisite trainings as documented in the Agilent Learning Management System called Success Factors.

Location	Category	Document Name	Page
EQR	General	ACE Self Qualification Certificate	15
EQR	General	Operator's training certificate and qualifications	16
EQR	Material	Certificate of Analysis Wavelength calibration solution	17
EQR	Material	Certificate of Analysis Wavelength calibration solution	18
EQR	Material	Certificate of Analysis Wavelength calibration solution	19
EQR	General	Instrument's Test Report	20
EQR	General	Instrument's Test Report	24

General

Document Name:

ACE Self Qualification Certificate



Agilent Compliance Engine Self Qualification

Date:August 5, 2025 6:49:50 PM

Drive Serial #:72418ECBPlatform Revision:ACE 3.13.62

Individual self-qualification reports for each specific technique installed are also available upon request. They provide additional details on the general report from the concise summary and are structured by the actual algorithms challenged during the process. There is not a one-to-one relationship between algorithms and OQ program tests because some algorithms are used by several tests and across multiple similar hardware components of the qualified systems.

Technique Type	Tests Completed	Result
Atomic Absorption	7	Conforms
Capillary Electrophoresis	10	Conforms
Dissolution	6	Conforms
Emission Spectroscopy	3	Conforms
Gas Chromatography	29	Conforms
Gas Chromatography - GCMS	17	Conforms
Gel Permeation Chromatography	9	Conforms
ICP-MS	6	Conforms
Infrared Spectroscopy	7	Conforms
Liquid Chromatography	17	Conforms
Liquid Chromatography - LCMS	8	Conforms
Microfluidics	18	Conforms
Sample Preparation - Gas Chromatography	9	Conforms
Sample Preparation - Liquid Chromatography	8	Conforms
Supercritical Fluid Chromatography	15	Conforms
Software	6	Conforms
UV-Vis Spectrophotometer	13	Conforms

Overall Qualification Status

Conforms

Document Name:

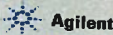
Operator's training certificate and qualifications

Agilent
Trusted Answers

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent authorized service provider, through which the service employee has ongoing access to Agilent's: Safety Alerts, Service Notes, internal technical updates, update training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

Materials

Document Name: Certificate of Analysis Wavelength calibration solution



CERTIFICATE OF ANALYSIS

Agilent Product Name: Wavelength Calibration Solution for ICP-OES & MP AES, 5 mg/L 500mL
Agilent Part No: 6619030100
Lot No: 1522647

Product Specifications

Analyte	Certified Conc.	Analyte	Certified Conc.
Al	5.000 ± 0.025 mg/L	Mn	5.000 ± 0.025 mg/L
As	5.000 ± 0.025 mg/L	Mo	5.000 ± 0.025 mg/L
Ba	5.001 ± 0.025 mg/L	Ni	5.002 ± 0.025 mg/L
Cd	5.000 ± 0.025 mg/L	Pb	4.998 ± 0.025 mg/L
Co	5.000 ± 0.025 mg/L	Se	5.000 ± 0.025 mg/L
Cr	4.999 ± 0.025 mg/L	Sr	5.000 ± 0.025 mg/L
Cu	5.000 ± 0.025 mg/L	Zn	4.999 ± 0.025 mg/L
K	50.00 ± 0.25 mg/L		

Matrix: 5% HNO₃

Storage Conditions: Store at Room Temperature (15°C to 30°C)

Intended Use: This solution is intended for use as a certified reference material or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), atomic absorption spectroscopy (flame AAS or GFAAS), microwave plasma atomic emission spectroscopy (MP-AES), x-ray fluorescence spectroscopy (XRF), and other techniques for elemental analysis.

Certification & Traceability: This CRM was manufactured under a quality management system that is registered to ISO 9001, ISO 17034 and ISO/IEC 17025. This CRM was prepared to the certified concentrations shown above by gravimetric methods using single-element concentrates that were certified using the "High Performance ICP-OES" protocol developed by NIST and are directly traceable to the NIST SRMs listed below. This solution was stabilized using high purity nitric acid (HNO₃) and diluted with filtered (0.22µm), 18 M-ohm deionized water. The balances used in the preparation of this CRM are calibrated regularly with traceability to NIST. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentrations were determined based upon gravimetric procedures. Secondary verification of the certified concentrations was performed using ICP-OES that was calibrated and/or referenced against NIST SRMs: 3101a, 3103a, 3104a, 3108, 3113, 3112a, 3114, 3141a, 3132, 3134, 3136, 3128, 3149, 3153a, and 3168a. The uncertainty associated with each certified concentration represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

Instructions for Use: Agilent recommends that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy the analyst should: (1) use only pre-cleaned containers and transferrers, (2) avoid pipetting directly from the CRM's original container, (3) use a minimum sub-sample size of 500µL, (4) make dilutions using calibrated balances or certified volumetric class A flasks and pipettes, (5) dilute to volume using the same matrix as the original CRM, and (6) never pour used product back into the original container. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or expose to direct sunlight. Minimize exposure to moisture or high humidity.

Page 1 of 2

Materials

Document Name: Certificate of Analysis Wavelength calibration solution

Agilent

Period of Validity: Agilent ensures the accuracy of this solution until the expiration date shown below, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of this solution.

Date of Release:
17 January 2025

Date of Expiration:
Earlier of 17 January 2027 or 12 Months from Date opened.

Date Opened: _____

Sample Test Approver:
Chuck Goudreau
Chuck Goudreau, Certifying Officer

Page 2 of 3

Date: November 17, 2025 1:10:28 PM
System ID: MY15350005

Materials

Document Name:

Certificate of Analysis Wavelength calibration solution



Agilent

Harvest Information: Refer to the Safety Data Sheet (SDS), which can be obtained at www.agilent.com/chem/sds.

Homogeneity: This solution was determined to be homogeneous by procedures consistent with the requirements of ISO 17034 and ISO Guide 35. Replicate samples of the finished solution were analyzed to confirm its homogeneity, in accordance with QSP 9-13 Assessment of Homogeneity and Stability. To ensure homogeneity, users should not take a smaller sub-sample than specified in the instructions for use, as doing so will invalidate the certified values and uncertainties.

Further Information: Please contact Agilent for further information about this CRM.

Quality Certification: This CRM was prepared under a quality management system that is:

- Registered to ISO 9001:2015 - Quality Management Systems - Requirements (TUV SUD America Certificate Number 051 38 8917)
- Accredited to ISO 17034 - General Requirements for the Competence of Reference Material Producers (A2LA Cert. No. 2848.02)
 - ISO 17034 references additional requirements specified in ISO Guide 31 and ISO Guide 35
- Accredited to ISO/IEC 17025 - General Requirements for the Competence of Testing and Calibration Laboratories (A2LA Cert. No. 2848.01)
- LSC Standard: 279 Alky Road, Mountain View, CA 94035

Page 3 of 3

Date:

November 17, 2025 1:10:28 PM

System ID:

MY15350005

General

Document Name:

Instrument's Test Report

Report Summary

Instrument Model	Agilent 5100/5110 VDV ICP-OES
Instrument ID	G8011A/G8015A
Instrument Serial Number	MY15350005
Software Version	7.6.2.12331
Firmware Version	5590
Tested By	OQ-Test
Test started on	11/17/2025 11:44:12 AM
Test Completed On	11/17/2025 11:57:26 AM

Result Summary

Subsystem Communications Test	Pass
Air Flow Test	Pass
Water Flow Test	Pass
Gas Flows Test	Pass
RF Generator Test	Pass
Camera Test	Pass
Optics Test	Pass
Advanced Valve System Test	Skipped
Resolution Test	Skipped
Sensitivity Test	Skipped
Precision Test	Skipped

Subsystem Communications TestPass

Air Flow TestPass

30% Air Flow (relative speed)	60% Air Flow (relative speed)
7.00	12.00

Water Flow TestPass

RF Water Flow(L/min)	Camera Water Flow (L/min)	Water Inlet Temperature (°C)
1.37	1.17	18.51

Document Name:

Instrument's Test Report

Gas Flows Test			Pass		
Nebulizer Target Flow	Actual Flow	Back Pressure	Auxiliary Target Flow	Actual Flow	Back Pressure
0.70	0.70	294.04	2.00	2.00	107.43
Makeup Target Flow	Actual Flow	Back Pressure	Plasma Target Flow	Actual Flow	Back Pressure
2.00	2.00	121.16	18.00	17.87	27.95
RF Generator Test			Pass		
RF Power Supply Test		Passed			
RF Power Supply (V)		147.522			
RF Oscillator Test		Passed			
RF Oscillator Frequency (MHz)		25.788			
Work Coil Current (A)		47.171			
RF Power Supply Current (A)		2.000			
Camera Test			Pass		
Black Level Test		Noise Test	Photo Response Test		
Passed		Passed	Passed		
Optics Test			Pass		
	Radial	Axial			
Intensity	2037667	2718575			
Wavelength	737.212	737.212			

Report Detail

Tests Run - Operator: OQ-Test

Subsystem Communications Test- Started

SubSystem Status

Mains Power Module - Passed

Gas Control Module - Passed

RF Generator - Passed

pre-optics Module - Passed

Optics/Camera Control Module - Passed

Page 2 of 4

Date:

November 17, 2025 1:10:28 PM

System ID:

MY15350005

Document Name:

Instrument's Test Report

Peristaltic Pump - Passed
Subsystem Communications Test Completed - Passed

Air Flow- Started

Fan Speed(%) Air Flow(relative speed) Status

30% 7 - Passed
60% 12 - Passed
Air Flow Completed - Passed

Water Flow- Started

RF Water Flow(L/min) = 1.37
Camera Water Flow (L/min) = 1.17
Water Inlet Temperature = 18.51
RF Water Flow(L/min) (off) = 0.00
Water Flow Completed - Passed

Gas Flows- Started

Channel Target Actual Pressure Failure Status

Auxiliary Gas 0.00 0.00 N/A N/A - Passed
Auxiliary Gas 2.00 2.00 N/A N/A - Passed
Nebulizer Gas 0.00 0.00 0.00 N/A - Passed
Nebulizer Gas 0.70 0.70 294.04 N/A - Passed
Plasma Gas 0.00 0.00 N/A N/A - Passed
Plasma Gas 18.00 17.87 N/A N/A - Passed
Makeup Gas 0.00 0.00 N/A N/A - Passed
Makeup Gas 2.00 2.00 N/A N/A - Passed
Purge Gas 0.70 0.70 N/A N/A - Passed
Purge Gas 3.70 3.70 N/A N/A - Passed
All Channel flows ON : - Passed
All Channel flows OFF : - Passed
Gas Flows Completed - Passed

RF Generator- Started

RF generator turned off - Passed
RF generator turned on - Passed
Bias Control = 0 V - Passed
RF Power Supply - Set Value = 150V, Actual Value = 147.52V - Passed
RF Oscillator Started - Passed
RF Oscillator Frequency(MHz) = 25.79 , Workcoil Current(Amps) = 47.17, RF Power Supply
Current(Amps) = 2.00 - Passed
RF Oscillator stopped - Passed
RF generator turned off - Passed
RF Generator Completed - Passed

Camera Test- Started

Black level test - PASSED
Noise test - PASSED
Photo response test - PASSED
Camera Test Completed - Passed

Optics Test- Started

Test View Mode Intensities Status

LED Off - Passed

Document Name:

Instrument's Test Report

Plasma ignite Started
Plasma ignite - Passed
Waiting 5 min for plasma warm up
Shutter opened - Passed
Peak Intensity Radial mode 2037666.51 - Passed
Shutter closed - Passed
Peak Intensity(closed shutter) Radial mode 34.10 - Passed
Shutter opened - Passed
Optical Argon Ratio: Calculated Value = 2.85, Factory Value = 3.00
Peak Intensity Axial mode 2718574.70 - Passed
Radial-Axial Intensity Ratio:(Range 0-100) - 1.33 - Passed
Shutter closed - Passed
Optics Test Completed - Passed

Page 4 of 4

Date: November 17, 2025 1:10:28 PM
System ID: MY15350005

General

Document Name: Instrument's Test Report

Report Summary

Instrument Model	Agilent 5100/5110 VDV ICP-OES
Instrument ID	G8011A/G8015A
Instrument Serial Number	MY15350005
Software Version	7.6.2.12331
Firmware Version	5590
Tested By	OQ-Test
Test started on	11/17/2025 11:35:02 AM
Test Completed On	11/17/2025 11:42:07 AM

Result Summary

Subsystem Communications Test	Skipped
Air Flow Test	Skipped
Water Flow Test	Skipped
Gas Flows Test	Skipped
RF Generator Test	Skipped
Camera Test	Skipped
Optics Test	Skipped
Advanced Valve System Test	Skipped
Resolution Test	Pass
Sensitivity Test	Pass
Precision Test	Pass

Page 1 of 4

Date: November 17, 2025 1:10:28 PM
System ID: MY15350005

Document Name:

Instrument's Test Report

Resolution Test

Pass

Element Wavelength	Specification	Width
N (174.213 nm)	≤ 9.40	7.30
As (188.980 nm)	≤ 8.20	6.33
C (193.027 nm)	≤ 11.50	8.61
Mo (202.032 nm)	≤ 8.20	6.57
Cr (206.158 nm)	≤ 13.40	9.76
Zn (213.857 nm)	≤ 8.70	7.18
Pb (220.353 nm)	≤ 9.50	7.45
Co (228.615 nm)	≤ 17.20	12.22
Ba (230.424 nm)	≤ 9.40	7.63
Mn (257.610 nm)	≤ 13.30	9.48
Mn (260.568 nm)	≤ 20.30	14.13
Cr (267.716 nm)	≤ 11.00	8.43
Cu (324.754 nm)	≤ 25.00	18.17
Cu (327.395 nm)	≤ 14.20	11.41
Sr (338.071 nm)	≤ 33.50	23.97
Ba (455.403 nm)	≤ 44.00	32.35
Sr (460.733 nm)	≤ 36.00	18.19
Ba (493.408 nm)	≤ 36.00	24.16
Ba (614.171 nm)	≤ 42.00	28.77
Ar (675.283 nm)	≤ 74.00	60.52
K (766.491 nm)	≤ 80.00	63.17

Page 2 of 4

Date:

November 17, 2025 1:10:28 PM

System ID:

MY15350005

Document Name:

Instrument's Test Report

Sensitivity Test**Pass****Radial**

Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (188.980 nm)	≥ 46.0	SRBR	153.9	571.0	13.1
Se (196.026 nm)	≥ 41.0	SRBR	133.9	521.7	14.4
Zn (213.857 nm)	≥ 1421.0	SRBR	7444.1	28566.6	14.7
Pb (220.353 nm)	≥ 46.0	SRBR	487.0	1621.2	10.9
Mn (257.610 nm)	≥ 3518.0	SRBR	38073.3	191916.5	25.4
Al (396.152 nm)	≥ 3.4	SBR	34.5	33627.8	947.5
Ba (493.408 nm)	≥ 34.0	SBR	21336.2	1292417.4	60.6
K (766.491 nm)	≥ 1.8	SBR	973.9	96096.4	98.6

Axial

Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (188.980 nm)	≥ 208.0	SRBR	652.3	1889.4	8.3
Se (196.026 nm)	≥ 159.0	SRBR	422.8	1983.2	21.5
Zn (206.200 nm)	≥ 243.0	SRBR	2152.9	7108.2	10.9
Zn (213.857 nm)	≥ 1743.0	SRBR	16719.7	117933.7	49.7
Cd (214.439 nm)	≥ 4227.0	SRBR	25127.7	88373.7	12.4
Pb (220.353 nm)	≥ 320.0	SRBR	2741.0	10543.9	14.8
Mn (257.610 nm)	≥ 10625.0	SRBR	140950.6	1177238.0	69.7
Cr (267.716 nm)	≥ 1048.0	SRBR	32278.9	229093.3	50.3
Cu (324.754 nm)	≥ 19.0	SBR	61.5	324452.5	5191.7
Al (396.152 nm)	≥ 6.0	SBR	37.6	243558.4	6311.8
Ba (493.408 nm)	≥ 60.0	SBR	37116.6	7927166.1	213.6
K (766.491 nm)	≥ 24.0	SBR	13454.0	3670579.8	272.8

Precision Test**Pass****Radial**

Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 2.60	1.54
Se (196.026 nm)	≤ 2.60	1.62
Zn (213.857 nm)	≤ 1.50	0.71
Pb (220.353 nm)	≤ 2.60	1.43
Mn (257.610 nm)	≤ 1.50	0.70

Page 3 of 4

Date:

November 17, 2025 1:10:28 PM

System ID:

MY15350005

Document Name:

Instrument's Test Report

Al (396.152 nm)	≤ 1.50	0.64
Ba (493.408 nm)	≤ 1.50	0.76
K (766.491 nm)	≤ 1.50	0.67
Axial		
Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 1.50	1.14
Se (196.026 nm)	≤ 1.50	0.87
Zn (206.200 nm)	≤ 1.50	0.53
Zn (213.857 nm)	≤ 1.50	0.34
Cd (214.439 nm)	≤ 1.50	0.38
Pb (220.353 nm)	≤ 1.50	0.43
Mn (257.610 nm)	≤ 1.50	0.70
Cr (267.716 nm)	≤ 1.50	0.40
Cu (324.754 nm)	≤ 1.50	0.49
Al (396.152 nm)	≤ 1.50	0.51
Ba (493.408 nm)	≤ 1.50	0.70
K (766.491 nm)	≤ 1.50	0.48

Report Detail

Tests Run - Operator: OQ-Test

Instrument Performance- Started

Instrument Performance Completed - Passed

Electronic Signature

Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and login to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

Details

Full Name of Signer:	Suwan Onkhom
Logged On User Name:	suwan.onkhom@non.agilent.com
Signature Creation Date:	November 17, 2025
Reason for Signature:	Executed protocol and published this original version of document

ACE Self Qualification Status

The installed version of ACE used to deliver this service passed qualification; the results conform with expected values. The self qualification summary report is available in the session folder location SDS\ClearStore\AceSelfQualification.

Regulatory Disclaimer

This document provides a protocol to verify and record instrument configuration and evidence of proper operation. It has been prepared from our interpretation of applicable regulations as well as industry best practices. The document is designed to provide an important component of a complete compliance package. Validation depends upon many factors and use of this protocol alone does not assure compliance. Agilent Technologies makes no promises or representations as to its sufficiency for any specific regulatory program.

Warranty

Agilent Technologies makes no warranty of any kind to this material, including but not limited to, the implied warranties or merchantability and fitness for a particular purpose. Agilent Technologies shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

User Name: suwan.onkhom
Report Generated by Hostname: DESKTOP-GIFC9N6

System Id: MY15350005
Print Date: November 17, 2025 1:10:45 PM

PMOQ_IO_TLC_6007991924_20251117 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 17, 2025 9:30:05 AM	Audit	SessionCreated	Session	Host Name: DESKTOP-GIFC9N6, Drive Serial Number: 7AA6157A
November 17, 2025 9:30:05 AM	start	Configuration	Session	None
November 17, 2025 9:30:05 AM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
November 17, 2025 9:31:12 AM	Audit	EqpLoaded	Session	EQP details for primary technique [Es] - File path: [ProtocolPacks/Es/Configurations/02.51/Es.02.51.eqp], EQP File Name: [Es.02.51.eqp], EQP Name: [AgilentRecommended], Protocol Revision :[Es.02.51]
November 17, 2025 9:31:15 AM	End	Configuration	Session	None
November 17, 2025 9:31:20 AM	start	Qualification	Session	PM
November 17, 2025 9:31:20 AM	start	Qualification	Session	OQ
November 17, 2025 9:31:20 AM	start	Execution	ES System Inspection : 5100 VDV, Chiller 1 - G8481A: ES System Inspection	None
November 17, 2025 9:31:37 AM	End	Execution	ES System Inspection : 5100 VDV, Chiller 1 - G8481A: ES System Inspection	Run Count : 1
November 17, 2025 9:31:39 AM	start	Execution	Spectrometer Maintenance : 5100 VDV, Chiller 1 - G8481A: Spectrometer Maintenance	None

User Name: suwan.onkhom

System Id: MY15350005

Report Generated by Hostname: DESKTOP-GIFC9N6

Print Date: November 17, 2025 1:10:45 PM

PMOQ_IO_TLC_6007991924_20251117 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 17, 2025 12:06:01 PM	End	Execution	Spectrometer Maintenance : 5100 VDV, Chiller 1 - G8481A: Spectrometer Maintenance	Run Count : 1
November 17, 2025 12:06:32 PM	start	Execution	Autosampler Maintenance : Autosampler 1 - SPS4: Autosampler Maintenance	None
November 17, 2025 12:06:38 PM	End	Execution	Autosampler Maintenance : Autosampler 1 - SPS4: Autosampler Maintenance	Run Count : 1
November 17, 2025 12:06:39 PM	start	Execution	Vapor Generator Maintenance : VGA77P: Vapor Generator Maintenance	None
November 17, 2025 12:10:02 PM	start	Execution	Vapor Generator Maintenance : VGA77P: Vapor Generator Maintenance	None
November 17, 2025 12:12:29 PM	End	Execution	Vapor Generator Maintenance : VGA77P: Vapor Generator Maintenance	Run Count : 1
November 17, 2025 12:15:29 PM	Audit	TestUnlocked	Vapor Generator Maintenance : VGA77P: Vapor Generator Maintenance	Deviation filed for Run Count : 1
November 17, 2025 12:15:29 PM	start	Execution	Vapor Generator Maintenance : VGA77P: Vapor Generator Maintenance	None
November 17, 2025 12:17:13 PM	End	Execution	Vapor Generator Maintenance : VGA77P: Vapor Generator Maintenance	Run Count : 2
November 17, 2025 12:17:21 PM	start	Execution	ES Service Review : 5100 VDV, Chiller 1 - G8481A: ES Service Review	None
November 17, 2025 12:17:43 PM	End	Execution	ES Service Review : 5100 VDV, Chiller 1 - G8481A: ES Service Review	Run Count : 1

Page 2 / 4

User Name: suwan.onkhom

System Id: MY15350005

Report Generated by Hostname: DESKTOP-GIFC9N6

Print Date: November 17, 2025 1:10:45 PM

PMOQ_IO_TLC_6007991924_20251117 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 17, 2025 12:17:44 PM	End	Qualification	Session	PM
November 17, 2025 12:17:44 PM	start	Qualification	Session	OQ
November 17, 2025 12:17:44 PM	start	Execution	CDS Logon Verification : Qualitative Test	None
November 17, 2025 12:58:24 PM	End	Execution	CDS Logon Verification : Qualitative Test	Run Count : 1
November 17, 2025 12:58:26 PM	start	Execution	Preparation : 5100 VDV: Qualitative Test - No setpoints associated	None
November 17, 2025 12:59:31 PM	End	Execution	Preparation : 5100 VDV: Qualitative Test - No setpoints associated	Run Count : 1
November 17, 2025 12:59:32 PM	start	Execution	Instrument Tests : 5100 VDV: Qualitative Test - No setpoints associated	None
November 17, 2025 12:59:51 PM	End	Execution	Instrument Tests : 5100 VDV: Qualitative Test - No setpoints associated	Run Count : 1
November 17, 2025 12:59:53 PM	start	Execution	Autosampler Operation : Autosampler 1 - SPS4: Qualitative Test - No setpoints associated	None
November 17, 2025 12:59:57 PM	End	Execution	Autosampler Operation : Autosampler 1 - SPS4: Qualitative Test - No setpoints associated	Run Count : 1
November 17, 2025 12:59:59 PM	End	Qualification	Session	OQ
November 17, 2025 12:59:59 PM	start	Reporting	Session	None

User Name: suwan.onkhom

System Id: MY15350005

Report Generated by Hostname: DESKTOP-GIFC9N6

Print Date: November 17, 2025 1:10:45 PM

PMOQ_IO_TLC_6007991924_20251117 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 17, 2025 1:04:26 PM	Audit	Reporting	Session	Report Generated : Report
November 17, 2025 1:05:39 PM	Audit	Reporting	Session	Report Signed : Report PDF Name: PMOQ_IO_TLC_6007991924_20251117_20251117_PM Report_1.pdf User Name: suwan.onkhom@non.agilent.com Full Name of Signer: Suwan Onkhom Reason for signature: Executed protocol and published this original version of document
November 17, 2025 1:09:04 PM	Audit	Reporting	Session	Report Generated : Certificate
November 17, 2025 1:09:43 PM	Audit	Reporting	Session	Report Generated : Report
November 17, 2025 1:10:28 PM	Audit	Reporting	Session	Report Signed : Certificate PDF Name: PMOQ_IO_TLC_6007991924_20251117_20251117_Certificate_1.pdf User Name: suwan.onkhom@non.agilent.com Full Name of Signer: Suwan Onkhom Reason for signature: Executed protocol and published this original version of document