

ภาคผนวก ค : เอกสารสอบเทียบความถูกต้อง
ของเครื่องมือเก็บตัวอย่าง

ANALYTICAL BALANCE (DU)

Model : XS205 DU

Serial No. : 1126323724

Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5 Lasalle Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10260
+66 2723 0382
MT-TH.ServiceSupport@mtl.com



Accuracy Calibration Certificate

Customer

Company: EASTERN THAI CONSULTING 1992 CO., LTD.
Address: 683 Moo 11, Sukhaphiban 6 Rd., Nong Khun
City: Sriracha
Zip / Postal: 20230
State / Province: Chonburi
Order Number: 00000000000000000000

Contact:

Weighing Device

Manufacturer: Mettler Toledo
Model: XS205DU
Serial No.: 1126323724
Building: Laboratory
Floor: 1
Room: Laboratory
Instrument Type: Weighing Instrument
Asset Number: LABE 05/1
Terminal Model: SAT
Terminal Serial No.: 1126323724
Terminal Asset No.: N/A

Range	Max Capacity	Readability (d)
1	81 g	0.00001 g
2	220 g	0.0001 g

Procedure

Calibration Guideline: EURAMET cp-18 v. 4.0 (11/2015)

METTLER TOLEDO Work Instruction: CP/W002/20

This calibration certificate contains measurements for As Found calibration. No As Left calibration was performed because the device was not modified after As Found calibration. Therefore, results for As Left correspond to As Found.

The sensitivity/span of the weighing instrument was adjusted before calibration with a built-in weight.

In accordance with EURAMET cp-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

As Found	Start: 28.9 °C	End: 26.8 °C	Start: 73.8 %	End: 71.9 %

As Found Calibration Date: 22-Jul-2021

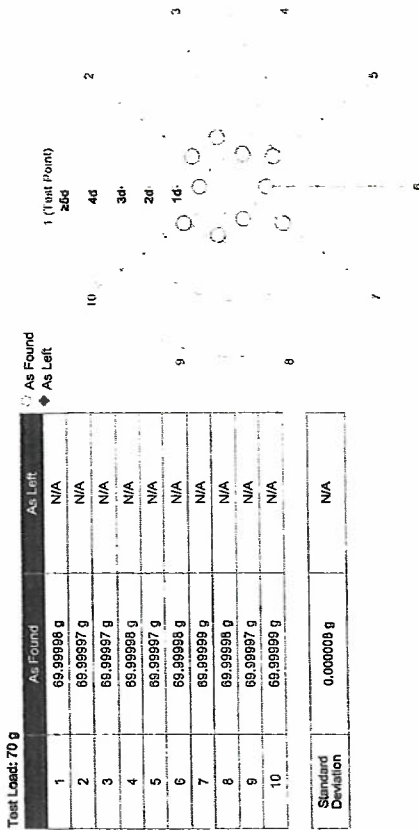
As Left Calibration Date: N/A

Issue Date: 23-Jul-2021

Approved Signatory:

Measurement Results

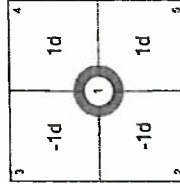
Repeatability



Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	99.9999 g	N/A
2	99.9998 g	N/A
3	99.9999 g	N/A
4	100.0000 g	N/A
5	100.0000 g	N/A
Maximum Deviation	0.0001 g	N/A

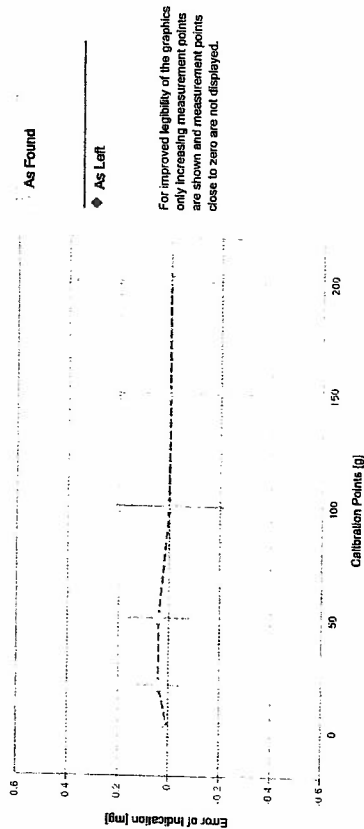


Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.00000 g	0.00000 g	0.00000 g	0.017 mg	2
2	0.01000 g	0.01000 g	0.00000 g	0.019 mg	2
3	0.10000 g	0.09999 g	-0.00001 g	0.023 mg	2
4	1.00000 g	1.00000 g	0.00000 g	0.032 mg	2
5	4.99998 g	5.00000 g	0.00002 g	0.048 mg	2
6	9.99999 g	10.00001 g	0.00002 g	0.061 mg	2
7	20.00001 g	20.00005 g	0.00004 g	0.082 mg	2
8*	49.99993 g	49.99997 g	0.00004 g	0.12 mg	2
9	99.99999 g	99.99999 g	0.00000 g	0.21 mg	2
10	149.99998 g	149.99998 g	0.00000 g	0.32 mg	2
11	199.99998 g	199.99998 g	0.00000 g	0.37 mg	2

*The calculated uncertainty was replaced by the CMC (Calibration and Measurement Capabilities) value because the calculated uncertainty was smaller than the CMC value.



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor $k = 2$ which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML E2

Weight Set No.: WS28

Certificate Number: 170241

Date of Issue: 17-Nov-2020

Calibration Due Date: 15-May-2022

Thermo Hygrometer

Equipment No.: IN51

Date of Issue: 02-Mar-2021

Calibration Due Date: 23-Feb-2022

Remarks

FACT adjustment functionality activated

Equipment condition: Good

Next calibration according to customer's procedure

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with $k=2$ in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: $1.5 \cdot 10^{-4} / K$
 Temperature range on site for the evaluation of the measurement uncertainty in use: 5 K

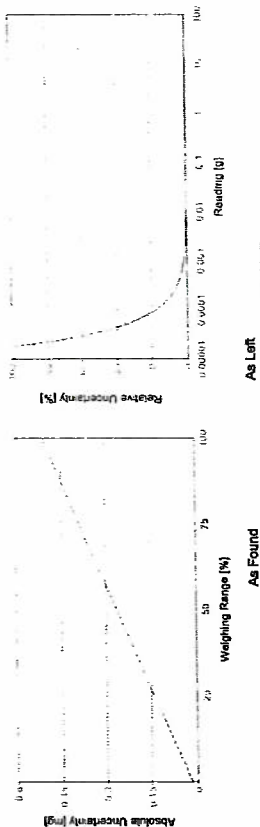
Linearization of Uncertainty Equation

Linearization of Uncertainty Equation				
Range		Max	As Found	As Left
d				
1	0.00001 g	81 g	$U_1 = 0.018 \text{ mg} + 0.00603 \text{ mg/g} \cdot R$	N/A
2	0.0001 g	220 g	$U_2 = 0.08 \text{ mg} + 0.00603 \text{ mg/g} \cdot R$	N/A

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Example)

Absolute and Relative Measurement Uncertainty in Use for Various Net Masses (As Found)			
Net Indication	As Found	As Left	
0.00220 g	0.018 mg	0.82%	N/A
0.02200 g	0.018 mg	0.082%	N/A
0.22000 g	0.019 mg	0.0088%	N/A
2.20000 g	0.031 mg	0.0014%	N/A
220.0000 g	1.4 mg	0.00063%	N/A



The weighing range shown in the absolute uncertainty graph refers to the first interval/range of the device.



GWP® Certificate

AS Found ✓ AS Left ✓

The weighing device meets the given process requirements.

The weighing device meets the given process requirements.

Tests Performed: ☒ As Found ☐ As Left ☒ No adjustments/modifications made, As Left results correspond to As Found.

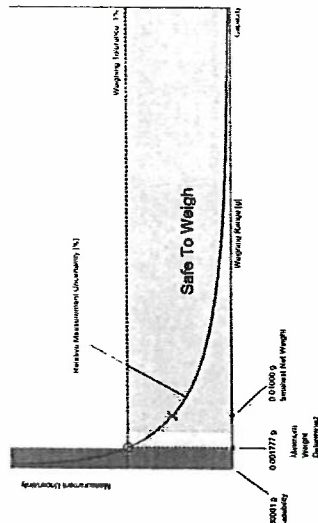
Process Requirements

Weighing Tolerance: 1%

Smallest Net Weight: 0.01000 g

Safety Factor: 2

Safe Weighing Range



While the values in this graph reflect the actual calibration results, the measurement uncertainty curves are simply a visual representation. The graph reflects As Left testing, unless only As Found was performed.

COPY

Minimum Weight

As Found Minimum Weight Table

Range 1

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.017873 g	0.035965 g	0.054282 g	0.091605 g	0.189140 g
0.2%	0.008909 g	0.017873 g	0.026891 g	0.045095 g	0.091605 g
0.5%	0.003557 g	0.007113 g	0.010697 g	0.017873 g	0.035965 g
1%	0.001777 g	0.003557 g	0.005339 g	0.008909 g	0.017873 g
2%	0.000888 g	0.001777 g	0.002667 g	0.004448 g	0.008909 g
5%	0.000355 g	0.000711 g	0.001066 g	0.001777 g	0.003557 g

The minimum weight table applies to the fine range of the weighing device.

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

As Left Minimum Weight Table

Range 1

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.017873 g	0.035965 g	0.054282 g	0.091605 g	0.189140 g
0.2%	0.008909 g	0.017873 g	0.026891 g	0.045095 g	0.091605 g
0.5%	0.003557 g	0.007113 g	0.010697 g	0.017873 g	0.035965 g
1%	0.001777 g	0.003557 g	0.005339 g	0.008909 g	0.017873 g
2%	0.000888 g	0.001777 g	0.002667 g	0.004448 g	0.008909 g
5%	0.000355 g	0.000711 g	0.001066 g	0.001777 g	0.003557 g

The minimum weight table applies to the fine range of the weighing device.

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1/1 (no safety factor), 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with $k = 2$ and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

Measurement Results

Results Summary

As Found		Repeatability	Eccentricity	Error of Indication
As Left		✓	✓	✓

✓ = Passed

✗ = Failed

NA = Safety Factor not met

Repeatability

Test Load: 70 g

Tolerance	Control Limit	As Found	Std. Deviation	Result	As Left	Std. Deviation	Result
0.1%	0.000005 g			✗			✗
0.2%	0.000010 g			✓			✓
0.5%	0.000025 g			✓			✓
1%	0.000050 g		0.000008 g	✓		0.000008 g	✓
2%	0.000100 g			✓			✓
5%	0.000250 g			✓			✓

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

Eccentricity

Test Load: 100 g

Tolerance	Control Limit	As Found	Deviation	Result	As Left	Deviation	Result
0.1%	0.0500 g			✓			✓
0.2%	0.1000 g			✓			✓
0.5%	0.2500 g			✓			✓
1%	0.5000 g		0.0001 g	✓		0.0001 g	✓
2%	1.0000 g			✓			✓
5%	2.5000 g			✓			✓

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

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BAROMETER

Equipment : Analog Barometer

ID No. / Tag No. : BM001/41



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD
214 Bangwaek Rd. Bangpai Bangkok 10160
Tel: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Certificate No. : AD2106-032-0001
Date Issued : 04-Jun-21

Customer : Eastern Thai Consulting 1992 Co., Ltd.
683 Moo 11 Sukhapibarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

Equipment : Analog Barometer

Manufacturer : Barigo
Model : -
Serial No. : -
ID No./Tag No. : BM001/41
Date Received : 02-Jun-21
Date Calibrated : 04-Jun-21

Calibrated by : [REDACTED]

Calibration Method or Calibration Procedure Used

In-house method : CP-21 base on DKD-R 6-1: Edition 3 2014.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Technical Manager, Miracle International Technology Company Limited.

Approved by :

Page 1 of 2

Certificate No. : AD2106-032-0001

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

STD Reading hPa	UUC Reading (hPa)		UUC Error hPa	Uncertainty \pm hPa
	Before Adjusted	After Adjusted		
990.00	990.0	-	0.00	0.91
1000.00	1000.0	-	0.00	0.91
1010.00	1010.0	-	0.00	0.91
1020.00	1020.0	-	0.00	0.91
1030.00	1030.0	-	0.00	0.91

STD = Standard

UUC = Unit Under Calibration

Calibrated condition :

Pressure Medium : Air : Density = 1.19 kg/m^3 @ 20°C , 1 bar
Mounting Position : Vertical
Reference Level : at center of its dial

Description of UUC :

Range : 935 - 1075 hPa Absolute
Calibration Range : 990 - 1030 hPa Absolute
Scale Interval : 1 hPa
Resolution : 0.5 hPa Absolute

Measurement Standards Used & Traceability :

The International System of Units (SI) through

IRPC Certificate No. CL1-P210029 for Digital Barometer Serial No. 290185, Due 19-Oct-21

End of Certificate

Page 2 of 2

CERTIFICATE OF ANALYSIS

EPA PROTOCOL GAS

Cylinder No. : EB0062815

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E04N198E15ACX9C Reference Number: 82-401135335-1
Cylinder Number: EB0062815 Cylinder Volume: 144.4 CF
Laboratory: 124 - Riverton (SAP) - NJ Cylinder Pressure: 2015 PSIG
PGVP Number: B52018 Valve Outlet: 560
Gas Code: CO,NO,NOX,SO2,BALN Certification Date: Mar 13, 2018
Expiration Date: Mar 13, 2026

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 volume/volume 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	Assay Dates
NOX	50.00 PPM	50.95 PPM	G1	03/08/2018, 03/13/2018
NITRIC OXIDE	50.00 PPM	50.50 PPM	G1	03/08/2018, 03/13/2018
SULFUR DIOXIDE	50.00 PPM	51.01 PPM	G1	03/08/2018, 03/13/2018
CARBON MONOXIDE	2000 PPM	1977 PPM	G1	03/08/2018, 03/13/2018
NITROGEN	Balance			
CALIBRATION STANDARDS				
Type	Lot ID	Cylinder No	Concentration	Uncertainty
NITRM	16060607	CC442864	50.42 PPM NITRIC OXIDE/NITROGEN	+/- 0.8%
PRM	12367	APEX1099237	9.82 PPM NITROGEN DIOXIDE/AIR	+/- 2.0%
SRMIS	0315201604	CC503558	4.975 PPM NITROGEN DIOXIDE/NITROGEN	+/- 1.8%
NITRM	16011025	CC473218	49.02 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.3%
NITRM	12060735	CC356192	2488 PPM CARBON MONOXIDE/NITROGEN	+/- 0.5%
The SRM, PRM or RGM noted above is only in reference to the GMS used in the assay and not part of the analysis.				
ANALYTICAL EQUIPMENT				
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration		
Nicolet 6700 APW1100391 CO	FTIR	Feb 06, 2018		
Nicolet 6700 APW1100391 NO	FTIR	Feb 15, 2018		
Nicolet 6700 APW1100391 NO2	FTIR	Feb 16, 2018		
Nicolet 6700 APW1100391 SO2	FTIR	Mar 01, 2018		

Triad Data Available Upon Request

NOTES-NET WEIGHT: 10.43lbs

GROSS WEIGHT: 60.93lbs

PO# 5218000763

This calibration std. has been certified in accordance with the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531. All testing processes and measurements conform to the requirements of ISO/IEC 17025 and to Airgas ISO 9001:2000 and relate only to items identified on this certificate. All items are certified to be NIST Traceable with total uncertainty as detailed under Analytical Uncertainty. This document shall not be reproduced in full without written approval of the issuer.



TESTING CERT No. 3082.05

Approved for Release

Hot Air Oven

Model : UFE 500

Serial No. : G511.0182



CERTIFICATE OF CALIBRATION

Certificate No. : 22-011766
Sample Code : 22-04498-003

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapiban 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Laboratory)

Equipment : Temperature controlled enclosures (Hot air oven)
Manufacturer : Memmert
Serial No. : G511.0182
Date of Receipt : 03 February 2022
Model : UFE 500
ID No. : LABE 17/4
Date of Calibration : 03 February 2022

Condition of Calibration

1. Environment	1.1 Ambient temperature	: Maximum 27.5 °C ; Minimum 26.4 °C
	1.2 Relative humidity	: Maximum 59.5 % ; Minimum 50.8 %
	1.3 Line voltage supplied	: Maximum 225.1 VAC ; Minimum 223.2 VAC

2. Calibration method

TLAS-G-20: Guidelines for calibration and checks of temperature controlled enclosures.

3. Reference standard instrument

Instrument	ID No.	Certificate No.	Due Date
Data Acquisition With Sensor (RTD-PH00)	LB-DA-11 (RTD-148 to RTD-155, RTD-227)	21-041213	08 May 2022

4. This certificate is traceable to the international system of unit (SI Unit).

The measurement is traceable to Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.

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

6. Condition of calibration item : Normal

Calibrated by

Approved by

Issue date

11 February 2022

The uncertainty is for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Center (TLAS) to the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

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Phlabphla, Wang Thonglang, Bangkok 10310
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Rev.01

CONTACT@AMARC.CO.TH
WWW.AMARC.CO.TH
Effective Date: 15/10/21



REPORT OF CALIBRATION

Certificate No. : 22-011766
Sample Code : 22-04498-003

Results of Calibration

Resolution : 0.5 °C

1. Reporting of Temperature

Calibration point (°C)	UUC* setting (°C)	UUC* reading (°C)	Measured temperature at each positions (°C)								Uncertainty ± (°C)	Coverage factor k	
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8			# g ^{ref}
104	103.5	103.5	104.46	104.45	#####	104.07	104.46	104.42	104.34	104.07	104.30	0.53	2.00

2. Characterization results

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
104	0.12	0.80	1.13

Notes

UUC* = Unit Under Calibration

361 Soi Ladprao 122, Ladprao Road,
Phlabphla, Wang Thonglang, Bangkok 10310
FM-CL-018

TEL 02-516-2422
FAX 02-516-6949
Rev.09

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WWW.AMARC.CO.TH
Effective Date: 15/10/21

REPORT OF CALIBRATION

Page 3 of 3

Certificate No. : 22-011766

Sample Code : 22-04498-003

Results of Calibration

Notes

1. Sensor installation locations
 - 1.1 All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
 - 1.2 The reference sensor is preferably located of the geometric center of the chamber.
2. Interior dimensions approx of chamber :
W = 56 cm ; D = 40 cm ; H = 48 cm
3. Air valve or fresh air level : Off
4. Fan level : Open

5. The quoted uncertainty includes* Stability of chamber and loading effect in chamber at 20% of uniformity*.

6. 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.

7. Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

8. Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.

9. UUC* reading - the average reading of indicating device that forms the integral part of the enclosure.

10. Calibration results without adjustment.

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M9003.

- End of Report -

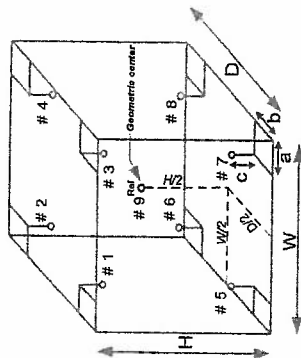


Figure: Example of sensor installation Positions

INDUCTIBELY COUPLED PLASMA SPECTROMETER

Model : Prodigy 7

Serial No. : P70177



บริษัท แอปพลิเคชัน ดีไซน์ จำกัด
Application Define Company Limited
8/4 หมู่ 9 บางชัน แขวง 9 บางพลี กรุงเทพมหานคร 10170
8/4 หมู่ 9 บางชัน แขวง 9 บางพลี กรุงเทพมหานคร 10170
Tel: (06) 2864 7137 E-mail: support@spdefine.co.th Website: http://www.spdefine.co.th
เบอร์โทรศัพท์มือถือ 0106559032491

CERTIFICATE OF INSTRUMENT PERFORMANCE

INSTRUMENT: INDUCTIVELY COUPLED PLASMA SPECTROMETER

BRAND: Teledyne Leeman Labs

MODEL: Prodigy 7

SERIAL NO. P70177

CUSTOMER: Eastern Thai Consulting 1992 Co., Ltd

CHECKING:

SPECTROMETER

Wavelength Accuracy check by use emission line of Hg Lamp

Mercury line 253.652 nm.

Plasma View (Dual View)

CMOS Detector check

Align View by Mn line 257.610 nm.

RF GENERATOR

Incident Power 1,200 ±10 Watt Reading = ...1,2.... Watt

SAMPLE INTRODUCTION

Plasma Torch, Injector, Spray chamber, Nebulizer

Peristaltic pump & Tubing

EXHAUSTING & COOLING SYSTEM

Safety Interlock Switch (Door, Argon pressure, Water pressure)

Cooling System, water flowrate & low pressure switch

Flowrate of Air blower

COMPUTER & SOFTWARE

Plasma Ignition software & Analytical Software

ANALYTICAL TEST

Full Frame Capture & Echellogram check

Calibration Curve & QC Test

STATUS

OK

OK

OK

OK

OK

OK

OK

OK

OK

OK

OK

OK

OK

OK

OK



TELEDYNE LEEMAN LABS
Everywhere you look

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีสเทิร์นไทย คอนซัลติง 1992 จำกัด Date: December 21, 2021

Instrument: ICP-OES Model: Prodigy 7 S/N: P70177

1. Gas Supply /Water Re-circulator/Exhaust Hood Checks

Gas system: ตรวจสอบแก๊สและเครื่อง Argon Pressure: 85 psi Leak inspected (✓) No leak Nitrogen Pressure: 10 psi Leak inspected (✓) No leak Oxygen Pressure: 10 psi Leak inspected (✓) No leak	
(✓) Change camera purge gas Dehydrator (1 times /years) Next time replacement <u>Check</u> เปลี่ยนตัวกลั่นแก๊สดีไฮเดรต 1 ปี	
Water Chiller: R3 generator flow rate 4.4 LPM Temperature 26.0 C ตรวจสอบอุณหภูมิ Leak inspected (✓) No leak ตรวจสอบการรั่วซึม	
Water Chiller: Camera (✓) check water level and refill ตรวจสอบระดับน้ำและเติมน้ำ (✓) change water เปลี่ยนน้ำ Temperature 34.0 C ตรวจสอบอุณหภูมิ	
Exhaust Hood Flow rate 650 CFM (system request > 150)	

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีทีทีแอล จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

2. Computer & Software Check

Description	Status
Interface Cable USB (✓) No broken	OK
Software Version	OK
(✓) Operation function check :	OK
(✓) Open /Save /Edit method	OK
(✓) Instrument Control	OK
(✓) Sequence	OK
(✓) Full Frame Capture (Echelle Mode)	OK
(✓) Auto alignment /Hg alignment	OK
(✓) Calibration Curve	OK
(✓) Re-Calculation	OK
(✓) Print Report	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีทีทีแอล จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

3. Instrument Control

Description	Status
Optical view position: ตรวจสอบตำแหน่งที่เห็นหลอดไฟ	
Hg Lamp Deltas	
X -1 Y -6	OK
XUV 0	OK
Axial peak positions X3325 Y1205	OK
Radial peak positions X4111 Y1105	OK
Hg lamp peak positions X4245 Y2615	OK
Plasma Control ตรวจสอบการทำงานของพลาสมา	
(✓) Auto Start	OK
(✓) Extinguish	OK
(✓) RF power setting	OK
(✓) Igniter	OK
(✓) Air Knife	OK
Torch Gas ตรวจสอบการทำงานของแก๊สในเตาเผา	
(✓) Coolant /Plasma Flow control	OK
(✓) Aux Flow	OK
(✓) Nebulizer Flow	OK
(✓) Optimize sample introduction function	OK
(✓) Peristaltic pump control	OK
(✓) Auto sampler Control	OK
(✓) Camera Support Module	OK
(✓) Diagnostic	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีซีเอส จำกัด 1992 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

4. Cleaning & Replacement

Description	Status
✓ O-Ring Torch replacement	OK
✓ Pump Tubing replacement	OK
✓ Glassware cleaning (Torch, Nebulizer, Spray chamber)	OK
✓ Lube the roll peristaltic pump	OK
✓ Optical windows cleaning	OK
✓ Camera Water Re-circulator (water change/ refilled)	OK
✓ RF Generator Water Re-circulator (water change/ refilled)	OK
✓ Cleaning Electronics Board with spray cleaner	OK
✓ Cleaning dust inside Unit	OK
✓ Cleaning dust filter	OK

5. Safety Interlock

Description	Status
✓ Door switch	OK
✓ RF Water Re-circulator	OK
✓ Camera Water Re-circulator	OK
✓ Camera purge gas	OK
✓ Argon pressure	OK
✓ Nitrogen pressure	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีซีเอส จำกัด 1992 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

6. Hardware Check with SALSA.EXE Diagnostics

Power Supply	Value	Status
-12 VDC (11 - 14.5 VDC)	-13.76	OK
+12 VDC (11 - 14.5 VDC)	12.010	OK
+3.3 VDC	3.286	OK
+5.0 VDC	4.995	OK
+13.5 VDC	13.465	OK
Plasma Generator	Value	Status
ICP Current 0.500A = 1kW	0.500	OK
ICP Ref 5.0Vdc = 1kW	5.470	OK
ICP Current 0.00 Vdc = 0kW	0	OK
ICP Ref 0.00Vdc = 0kW	0	OK
RF Water (Hz) OFF	0	OK
RF Water (Hz) ON	0	OK
Air Knife Pres. (0.00V) OFF	0	OK
Air Knife Pres. (3.0 - 7.0 V) ON	3.470	OK
Neb 25 @ setting of 25 PSI	25	OK
Cool 18 @ setting of 18 LPM	18	OK
Aux 0.6 @ setting of 0.6 LPM	0.6	OK
Camera Water pump	Value	Status
Pump Current (0.000 A) OFF	0	OK
Pump Voltage (0.000 V) OFF	0	OK
Pump Current (0.8 to 4.0A) ON	1.000	OK
Pump Voltage (8 to 13 V) ON	12.52	OK
Set Points	Value	Status
Air In Set Point 32°C	32	OK
Cam Temp Temperature -32°C	-32	OK
Op Purge Low 0.77 LPM	0.77	OK
Op Purge High 15.50 LPM	15.5	OK
Cam Wtr T 28°C	28.02	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท สิตภัณฑ์ไทยพาณิชย์ จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

7. Min Check for performance Test

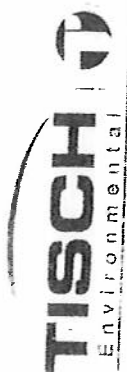
	Condition for performance Test	Condition Test	Status
Standard	1 ppm, 5 ppm, 10 ppm	10 ppm	OK
Power plasma	1.20 kw	1.2	OK
Plasma gas	16.0 LPM	16	OK
Auxiliary Gas	0.8 LPM	0.8	OK
Nebulizer	1.2 LPM	2.5 psi	OK
Pump Speed	25 RPM	25	OK
Integration time	15 s Axial, 5 s Radial	10 s, 5 s	OK
Nebulizer Type	Seaspray, Conical, Meinhard	Conical	OK
Intensity first performance	1 ppm ≥ 4,000,000 5 ppm ≥ 15,000,000 10 ppm ≥ 50,000,000	64,343,426	OK

ORIFICE TRANSFER STANDARD CERTIFICATION

WORKSHEET TE-5025A

ROOTSMETER S/N 0438320

TISCH ENVIRONMENTAL, INC.
145 SOUTH MIAMI AVE
VILLAGE OF CLEVELAND, OH
44102
513.467.9000
877.263.7610 TOLL FREE
513.467.9009 FAX



ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Mar 24, 2016 Rootmeter S/N 0438320 Ta (K) - 295
Operator Tisch Orifice I.D. - 0136 Pa (mm) - 742.95

PLATE OR Run #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER DIFF Hg (mm)	ORIFICE DIFF H2O (in.)
1	NA	NA	1.00	1.3400	3.2	2.00
2	NA	NA	1.00	0.9510	6.3	4.00
3	NA	NA	1.00	0.8510	7.8	5.00
4	NA	NA	1.00	0.8130	8.6	5.50
5	NA	NA	1.00	0.6690	12.6	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	Va	(x axis) Qa	(y axis)
0.9832	0.7337	1.4054	0.9957	0.7430	0.8911
0.9791	1.0396	1.9875	0.9915	1.0426	1.2503
0.9770	1.1481	2.2221	0.9894	1.1626	1.4090
0.9760	1.2006	2.3305	0.9884	1.2157	1.4778
0.9707	1.4510	2.8107	0.9830	1.4694	1.7823
Qstd slope (m) = 1.96262	Qa slope (m) = 1.22896				
intercept (b) = -0.03249	intercept (b) = -0.02060				
coefficient (r) = 0.99993	coefficient (r) = 0.99993				
y axis = SQRT[H2O(Pa/760) (298/Ta)]			y axis = SQRT[H2O(Ta/Pa)]		

CALCULATIONS

Vstd = Diff. Vol [(Pa-Diff. Hg)/760] (298/Ta)
Qstd = Vstd/Time

Va = Diff Vol [(Pa-Diff Hg)/Pa]
Qa = Va/Time

For subsequent flow rate calculations:

$$Qstd = 1/m \{ [SQRT(H2O(Pa/760) (298/Ta))] - b \}$$

$$Qa = 1/m \{ [SQRT H2O(Ta/Pa)] - b \}$$

Primary Flow Calibrator

Serial No. : 110619

Certificate of Calibration

Customer Name : Eastern Thai Consulting 1992 Co., Ltd.
Request No : Reg-2022-0122
Certificate No : 22-AFM-016 Rev.1

Name : Eastern Thai Consulting 1992 Co., Ltd.
Address : 683 Moo 11, Sukhapibarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

Unit Under Calibration Details

Measurement Item	: Primary Flow Calibrator	Sensor Model : -
Manufacturer	: BIOS	Sensor Serial Number : -
Model	: Defender \$10-L	
Serial Number	: 110619	
ID	: -	

ID : -
Location of Calibration : LAB 4 AIR VELOCITY METER

Calibration Environment and Details

Temperature	: 23 °C ± 3 °C
Humidity	: 55 %RH ± 20 %RH
Barometric Pressure	: 1013 hPa ± 10 hPa
Received Date	: 21 January 2022
Calibration Date	: 27 January 2022

Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Air Flow Meter	Gillibrator 3 Low flow	18501010006	Sensidyne	21 May 2022
Air Flow Meter	Gillibrator 3 Standard flow	19031011003	Sensidyne	20 May 2022

Traceability :

Traceability : This certificate provides traceability of measurement to recognized national standard, and to the realization of the international System of

Units (SI)

Note :

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

This Certificate was issued to replace to Calibration Certificate No. 22-AFM-016

Calibration By

Approved By

Issue Date:

11 February 2022

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the innovative instrument Co., Ltd.

FM-708-AFM-01 Rev.00 Issue date 01/07/19

10/07/19

THERMO-HYGROMETER

Model : 608-H1

Serial No. : 45106737



Certificate No. : 21-062722
Sample code : 21-24788-002

Page 2 of 2

REPORT OF CALIBRATION

Results of calibration

- Temperature measurement
Resolution of unit under calibration : 0.1 °C
Range : 0 °C to 50 °C

Calibration point °C	Average of standard reading		Unit under calibration		Expanded uncertainty °C
	Controlled humidity %RH	Temperature °C	Average reading °C	Correction value °C	
20	50	20.02	20.1	- 0.08	± 0.40
25	50	25.02	25.0	+ 0.02	± 0.40
30	50	30.00	29.7	+ 0.30	± 0.40

Humidity measurement

- Resolution of unit under calibration : 0.1 %RH
Range : 10 %RH to 85 %RH

Calibration point %RH	Average of standard reading		Unit under calibration		Expanded uncertainty %RH
	Air temperature °C	Calculated humidity %RH	Average reading %RH	Correction value %RH	
45	25.00	45.13	52.4	- 7.27	± 1.3
60	25.00	60.03	67.5	- 7.47	± 1.5
75	25.00	75.20	82.5	- 7.30	± 1.7

Note

- Calibration results without adjustment

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2.00, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

End of report



Certificate No. : 21-062722
Sample code : 21-24788-002

Page 1 of 2

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO.,LTD
683 Moo 11,Sukhapiban 8 Rd,Nongkham,
Sriacha,Chonburi 20230

Location of calibration : Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.
(Calibration laboratory)

Equipment : Digital thermo-hygrometer
Manufacturer : Testo
Model : 608-H1
Serial No. : 45106737
ID No. : LABE 09/7
Date of receipt : 23 July 2021
Date of calibration : 29 July 2021

Condition of calibration

1 Environment Ambient temperature : 23.0 °C ± 3.0 °C
Relative humidity : 55.0 % ± 15.0 %

Calibration method

2.1 In-house method : WI-CL-045 By comparison with thermometer standard / chilled mirror hygrometer in controlled chamber.
2.2 The calibration by comparison unit under calibration (UUC) to the thermometer standard / chilled mirror hygrometer in controlled chamber in a chamber at the controlled temperature/ relative humidity.

Reference standard Instrument

Instrument	Model	Code No.	Certificate No.	Due date
3.1 Chilled Mirror	Optidew Vision	LB-DP-02 & LB-DP-02 (DP)	TH-0018-21	10 March 2022
3.2 Digital Thermometer	Optidew Vision	LB-DP-02 & LB-DP-02 (Temp.)	21-032217	06 April 2022
3.3 Digital Thermometer	34972A	LB-DA-07 with RTD-89	20-085967	17 September 2021

This certificate is traceable to the international system of unit (SI Unit)

4.1 Instrument No.3.1 through : National Institute of Metrology (Thailand)
4.2 Instrument No.3.2 and 3.3 through : Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.

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

6 Condition of calibration item : Normal

Calibrated by

Approved

Date of issue : 11 August 2021

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme, which has recognized the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)

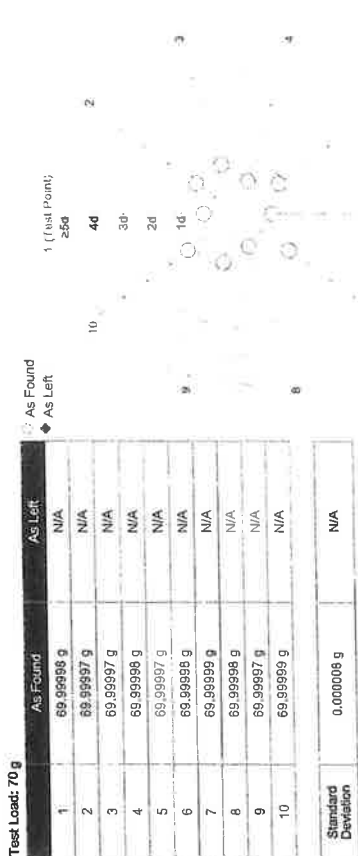
ANALYTICAL BALANCE (DU)

Model : XS205 DU

Serial No. : 1126323724

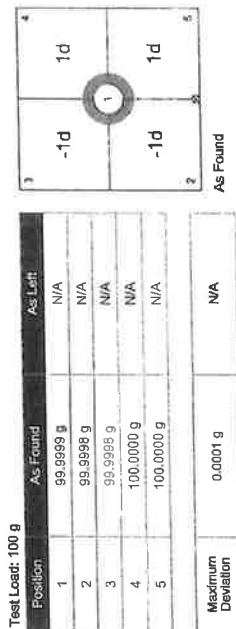
Measurement Results

Repeatability



The "g" in the graph represents the readability of the range/interval in which the test was performed.
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity



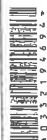
The "g" in the graph represents the readability of the range/interval in which the test was performed.



Accuracy Calibration Certificate

Customer

Company: EASTERN THAI CONSULTING 1992 CO., LTD.
Address: 683 Moo 11, Sukhaphiban 8 Rd., Nong Kham
City: [REDACTED]
Contact: [REDACTED]
Zip / Postal: 20230
State / Province: Chonburi
Order Number: [REDACTED]



Weighing Device

Manufacturer: Mettler Toledo
Model: XS205DU
Serial No.: 1126323724
Building: Laboratory
Floor: 1
Room: Laboratory
Weighing Instrument: LABE 05/1
Asset Number: SAT
Terminal Model: 1126323724
Terminal Serial No.: N/A
Terminal Asset No.: N/A

Range	Max. Capacity	Readability (d)
1	81 g	0.00001 g
2	220 g	0.0001 g

Procedure

Calibration Guideline: EURAMET cg-18 v. 4.0 (11/2015)
CP/M002/20
Mettler Toledo Work Instruction:
This calibration certificate contains measurements for As Found calibration. No As Left calibration was performed because the device was not modified after As Found calibration. Therefore, results for As Left correspond to As Found.
The sensitivity/span of the weighing instrument was adjusted before calibration with a built-in weight.
In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

As Found	Start: 26.9 °C	End: 26.8 °C	Start: 73.8 %	End: 71.9 %
Temperature				
Humidity				

As Found Calibration Date: 22-Jul-2021
As Left Calibration Date: N/A
Issue Date: 23-Jul-2021
Calibrator: [REDACTED]
Approved Signatory: [REDACTED]

Remarks

FACT adjustment functionality activated
Equipment condition: Good
Next calibration according to customer's procedure

End of Accredited Scope

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

Error of Indication

As Found	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.00000 g	0.00000 g	0.00000 g	0.017 mg	2
2	0.01000 g	0.01000 g	0.00000 g	0.019 mg	2
3	0.10000 g	0.09999 g	-0.00001 g	0.023 mg	2
4	1.00000 g	1.00000 g	0.00000 g	0.032 mg	2
5	4.99998 g	5.00000 g	0.00002 g	0.048 mg	2
6	9.99999 g	10.00001 g	0.00002 g	0.061 mg	2
7	20.00001 g	20.00005 g	0.00004 g	0.082 mg	2
8*	49.99993 g	49.99997 g	0.00004 g	0.12 mg	2
9	99.9999 g	99.9999 g	0.0000 g	0.21 mg	2
10	149.9998 g	149.9998 g	0.0000 g	0.32 mg	2
11	199.9998 g	199.9998 g	0.0000 g	0.37 mg	2

*The calculated uncertainty was replaced by the CMC (Calibration and Measurement Capabilities) value because the calculated uncertainty was smaller than the CMC value.



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor k – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML E2

Weight Set No.:	WS28	Date of Issue:	17-Nov-2020
Certificate Number:	170241	Calibration Due Date:	15-May-2022

Thermo Hygrometer

Equipment No.:	IN51	Date of Issue:	02-Mar-2021
Certificate Number:	21H403	Calibration Due Date:	23-Feb-2022

Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with $k=2$ in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: $1.5 \cdot 10^{-4} / K$

Temperature range on site for the evaluation of the measurement uncertainty in use: $5 K$

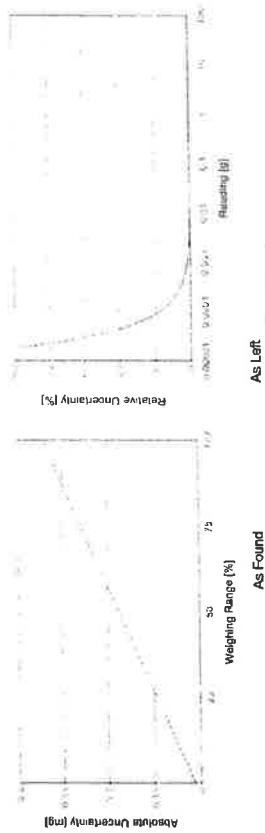
Uncertainty of Uncertainty Equation

Range	d	Max.	As Found	
			As Found	As Left
1	0.00001 g	81 g	$U_1 = 0.018 \text{ mg} + 0.00608 \text{ mg/g} \cdot R$	N/A
2	0.0001 g	220 g	$U_2 = 0.06 \text{ mg} + 0.00603 \text{ mg/g} \cdot R$	N/A

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Net Indication		As Found		As Left	
0.00220 g	0.018 mg	0.018 mg	0.82%	N/A	N/A
0.02200 g	0.018 mg	0.018 mg	0.082%	N/A	N/A
0.22000 g	0.019 mg	0.019 mg	0.0088%	N/A	N/A
2.20000 g	0.031 mg	0.031 mg	0.0014%	N/A	N/A
22.0000 g	1.4 mg	1.4 mg	0.0063%	N/A	N/A



The weighing range shown in the absolute uncertainty graph refers to the first interval/range of the device.



GWP® Certificate

As
Found

As
Left

The weighing device meets the given process requirements.

The weighing device meets the given process requirements.

Tests Performed:

As Found

As Left

No adjustments/modifications made. As Left results correspond to As Found.

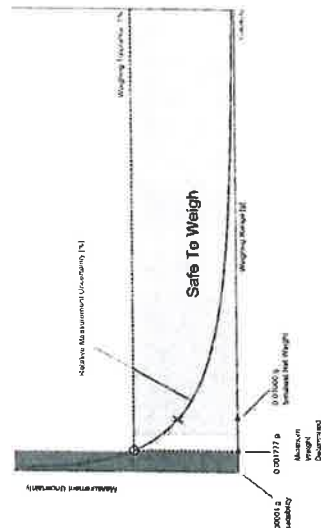
Process Requirements

Weighing Tolerance: 1%

Smallest Net Weight: 0.01000 g

Safety Factor: 2

Safe Weighing Range



While the values in this graph reflect the actual calibration results, the measurement uncertainty curves are simply a visual representation. This graph reflects As Left testing, unless only As Found was performed.

Minimum Weight

As Found Minimum Weight Table

Range 1

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.017873 g	0.035965 g	0.054282 g	0.091605 g	0.189140 g
0.2%	0.008909 g	0.017873 g	0.026891 g	0.045955 g	0.091605 g
0.5%	0.003557 g	0.007123 g	0.010697 g	0.017873 g	0.035965 g
1%	0.001777 g	0.003557 g	0.005339 g	0.008909 g	0.017873 g
2%	0.000888 g	0.001777 g	0.002667 g	0.004448 g	0.008909 g
5%	0.000355 g	0.000711 g	0.001066 g	0.001777 g	0.003557 g

The minimum weight table applies to the fine range of the weighing device.

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

As Left Minimum Weight Table

Range 1

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.017873 g	0.035965 g	0.054282 g	0.091605 g	0.189140 g
0.2%	0.008909 g	0.017873 g	0.026891 g	0.045955 g	0.091605 g
0.5%	0.003557 g	0.007123 g	0.010697 g	0.017873 g	0.035965 g
1%	0.001777 g	0.003557 g	0.005339 g	0.008909 g	0.017873 g
2%	0.000888 g	0.001777 g	0.002667 g	0.004448 g	0.008909 g
5%	0.000355 g	0.000711 g	0.001066 g	0.001777 g	0.003557 g

The minimum weight table applies to the fine range of the weighing device.

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1/1 (no safety factor) 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with $k = 2$ and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

Measurement Results

Results Summary

Repeatability		As Found	As Left	Error of Indication
✓ = Passed	✓	✓	✓	✓
✗ = Failed	✗	✗	✗	✗

A_s = Safety Factor not met

Repeatability

Test Load: 70 g

Tolerance	Control Limit	As Found	As Left	Std. Deviation	Result	As Left	Std. Deviation	Result
0.1%	0.000005 g	✓	✓	✓	✓	✓	✓	✓
0.2%	0.000010 g	✓	✓	✓	✓	✓	✓	✓
0.5%	0.000025 g	✓	✓	✓	✓	✓	✓	✓
1%	0.000050 g	✓	✓	✓	✓	✓	✓	✓
2%	0.000100 g	✓	✓	✓	✓	✓	✓	✓
5%	0.000250 g	✓	✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

Eccentricity

Test Load: 100 g

Tolerance	Control Limit	As Found	As Left	Std. Deviation	Result	As Left	Std. Deviation	Result
0.1%	0.0500 g	✓	✓	✓	✓	✓	✓	✓
0.2%	0.1000 g	✓	✓	✓	✓	✓	✓	✓
0.5%	0.2500 g	✓	✓	✓	✓	✓	✓	✓
1%	0.5000 g	✓	✓	✓	✓	✓	✓	✓
2%	1.0000 g	✓	✓	✓	✓	✓	✓	✓
5%	2.5000 g	✓	✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

METTLER TOLEDO Service

Attachment to Calibration Certificate:
TH2046-069-072221-ACC-TH
GWP® Certificate

Error of Indication

As Found

Reference Value		Control limits for various weighing tolerances							
		0.1%	0.2%	0.5%	1%	2%	5%		
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A		
20.00001 g	0.00004 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g		
49.99993 g	0.00004 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g		
99.99998 g	0.00000 g	0.05000 g	0.10000 g	0.25000 g	0.50000 g	1.00000 g	2.50000 g		
149.99998 g	0.00000 g	0.07500 g	0.15000 g	0.37500 g	0.75000 g	1.50000 g	3.75000 g		
199.99998 g	0.00000 g	0.10000 g	0.20000 g	0.50000 g	1.00000 g	2.00000 g	5.00000 g		
Result		✓	✓	✓	✓	✓	✓	✓	✓

As Left

Reference Value		Control limits for various weighing tolerances							
		0.1%	0.2%	0.5%	1%	2%	5%		
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A		
20.00001 g	0.00004 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g		
49.99993 g	0.00004 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g		
99.99998 g	0.00000 g	0.05000 g	0.10000 g	0.25000 g	0.50000 g	1.00000 g	2.50000 g		
149.99998 g	0.00000 g	0.07500 g	0.15000 g	0.37500 g	0.75000 g	1.50000 g	3.75000 g		
199.99998 g	0.00000 g	0.10000 g	0.20000 g	0.50000 g	1.00000 g	2.00000 g	5.00000 g		
Result		✓	✓	✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.

METTLER TOLEDO

Service Date: 2021-07-22
Document Number: TH2046-542-072221-LABBalanceHR
EASTERN THAI CONSULTING 1992 CO., LTD.
883 Moo 11, Sukphiban 8 Rd., Nong Kham, Sriracha, Chonburi 20230
Sasiporn Nakin

Balance Health Report

Device Details

System Details	
Manufacturer:	Mettler Toledo
Model:	XS205DU
Serial number:	1126323724
Firmware:	4.00 / 5.61
Weight set for routine testing:	Yes /

History

Device History		Service History	
Instrument in use:	Yes	Last preventive maintenance:	< 1 year
Instrument age:	> 10 years	Last instrument calibration:	< 1 year
Spare parts available:	Yes	Last minimum weight determination:	Never
Regulators:	ISO	Routine testing performed:	Yes
Process tolerance in %:	1%		
Smallest sample net weight:	0.01000 g		

Check List

Environmental Conditions		General & Functional Checks	
Room temperature fluctuation	✓	Leveling	✓
Exposure to direct sun	✓	Cleanliness	✓
Vibrations	✓	Completeness - missing parts see additional remarks	✓
Draft	✓	Settings optimized for operating environment	✓
Dirt or dust	✓	Other - objections noted as additional remarks	—
Shield	✓	Electrical Component Checks	
Mechanical Component Checks		Power supply	✓
Draft shield	✓	Sliding door drive	—
Weighing pan position	✓	Internal weight drive	✓
Housing	✓	Display	✓
Other - objections noted as additional remarks	—	Other - objections noted as additional remarks	—

Recommendations

Measurement Result Quality		Process Efficiency	
Instrument calibration	Uninstall instrument		
Identify safe weighing range	Replace instrument		
GWP verification / risk assessment	Yes	Replace / add parts (see additional remarks)	
Preventive maintenance	Onsite repair		
Perform routine testing with test weights	Depot repair		
User training	Use of accessories (see additional remarks)		
Contact	Name: Sasiporn Nakin	Position:	Phone: 0950013303
		Email:	dc_lab@et1992.com
Additional Remarks & Recommendations			
Engineer Details			

This is not a certificate.
It should not be used to interpret final results for the testing of these devices.

Legend: ✓ Good/Pass ⚠ Needs Attention ✗ Bad/Fail — Not Applicable

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www.mt.com

METTLER TOLEDO Service

Report Version: 1.13, Software Version: 4.28.0.3, Page: 1/1, © METTLER TOLEDO

BAROMETER

Equipment : Analog Barometer

ID No. / Tag No. : BM001/41



MIRACLE INTERNATIONAL TECHNOLOGY CO., LTD
214 Bangwaek Rd. Bangpai Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Certificate No. : AD2106-032-0001

Date Issued : 04-Jun-21

Customer : Eastern Thai Consulting 1992 Co., Ltd.
683 Moo 11 Sukhapibarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

Equipment : Analog Barometer

Manufacturer : Barigo
Model : -
Serial No. : -
ID No./Tag No. : BM001/41
Date Received : 02-Jun-21
Date Calibrated : 04-Jun-21

Calibrated by

Calibration Method or Calibration Procedure Used

In-house method : CP-21 base on DKD-R 6-1: Edition 3 2014.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Technical Manager, Miracle International Technology Company Limited.

Approved by :

Page 1 of 2

Certificate No : AD2106-032-0001

Environment : Ambient Temperature : (25 ± 2)°C

Relative Humidity : (50 ± 15)%RH

STD Reading hPa	UUC Reading (hPa) Before Adjusted	UUC Reading (hPa) After Adjusted	UUC Error hPa	Uncertainty ± hPa
990.00	990.0	-	0.00	0.91
1000.00	1000.0	-	0.00	0.91
1010.00	1010.0	-	0.00	0.91
1020.00	1020.0	-	0.00	0.91
1030.00	1030.0	-	0.00	0.91

STD = Standard

UUC = Unit Under Calibration

Calibrated condition :

Pressure Medium
Mounting Position
Reference Level

Air : Density = 1.19 kg/m³ @ 20°C, 1 bar
Vertical
at center of its dial

Description of UUC :

Range : 955 - 1075 hPa Absolute
Calibration Range : 990 - 1030 hPa Absolute
Scale Interval : 1 hPa
Resolution : 0.5 hPa Absolute

Measurement Standards Used & Traceability :

The International System of Units (SI) through

IRPC Certificate No. CL1-P210029 for Digital Barometer Serial No. 290185, Due 19-Oct-21

End of Certificate

Page 2 of 2

Hot Air Oven

Model : UFE 500

Serial No. : G511.0182

NSC-TIS-TIS17025
CALIBRATION 0152

Page 1 of 3

Certificate No. : 22-011766

Sample Code : 22-04498-003

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.

883 Moo 11, Sukhapiban 8 Rd., Nongkham,

Sriracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.

(Laboratory)

Equipment : Temperature controlled enclosures (Hot air oven)

Manufacturer : Memmert

Model : UFE 500

Serial No. : G511.0182

ID No. : LABE 17/4

Date of Receipt : 03 February 2022

Date of Calibration : 03 February 2022

Condition of Calibration

1. Environment
- | | | | | |
|---------------------------|-----------|-----------|-----------|-----------|
| 1.1 Ambient temperature | : Maximum | 27.5 °C | : Minimum | 26.4 °C |
| 1.2 Relative humidity | : Maximum | 59.5 % | : Minimum | 50.8 % |
| 1.3 Line voltage supplied | : Maximum | 225.1 VAC | : Minimum | 223.2 VAC |

Calibration method

TLAS G-20: Guidelines for calibration and checks of temperature controlled enclosures.

3. Reference standard instrument

Instrument	ID No.	Certificate No.	Due Date
Data Acquisition With Sensor (RTD-PH00)	LB-DA-11 (RTD-148 to RTD-155, RTD-227)	21-041213	09 May 2022

4. This certificate is traceable to the international system of unit (SI Unit).

The measurement is traceable to Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.

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

6. Condition of calibration item : Normal

Calibrated by

Approved by

Issue date

11 February 2022

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

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WWW.AMARC.CO.TH

Effective Date: 15/10/21

NSC-TIS-TIS17025
CALIBRATION 0152

Page 2 of 3

Certificate No. : 22-011766

Sample Code : 22-04498-003

REPORT OF CALIBRATION

Results of Calibration

Resolution : 0.5 °C

1. Reporting of Temperature

Calibration point (°C)	UUC* setting (°C)	UUC* reading (°C)	Measured temperature at each positions (°C)								Uncertainty ± (°C)	Coverage factor k
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9 nd	
104	103.5	103.5	104.46	104.45	####	104.07	104.46	104.34	104.07	104.30	0.53	2.00

2. Characterization results

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
104	0.12	0.80	1.13

Notes

UUC* = Unit Under Calibration

361 Soi Ladprao 122, Ladprao Road,

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Rev.09

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WWW.AMARC.CO.TH

Effective Date: 15/10/21

REPORT OF CALIBRATION

Page 3 of 3

Certificate No. : 22-01766

Sample Code : 22-04498-003

Results of Calibration

Notes

1. Sensor installation locations
 - 1.1 All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
 - 1.2 The reference sensor is preferably located of the geometric center of the chamber.
2. Interior dimensions approx of chamber :
W = 56 cm ; D = 40 cm ; H = 48 cm
3. Air valve or fresh air level : Off
4. Fan level : Open
5. The quoted uncertainty includes " Stability of chamber and loading effect in chamber at 20% of uniformity ".
6. 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.
7. Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.
8. Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.
9. UUC* reading - the average reading of indicating device that forms the integral part of the enclosure.
10. Calibration results without adjustment.

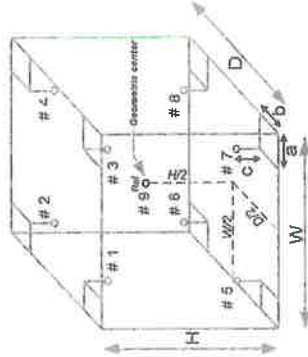


Figure: Example of sensor installation Positions

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

- End of Report -

Primary Flow Calibrator

Serial No. : 110619

Certificate No : 22-AFM-016 Rev.1
Request No : Req-2022-0122

Name : Eastern Thai Consulting 1992 Co., Ltd.
Address : 683 Moo 11, Sukhapibarn 8 Rd., Nongkham, Sitarcha, Chonburi 20230

Measurement Item	: Primary Flow Calibrator	Sensor Model : -
Manufacturer	: BIOS	Sensor Serial Number : -
Model	: Defender 510-L	
Serial Number	: 110619	
ID	: -	

Calibration Environment and Details

Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	18501010006	Sensidyne	21 May 2022
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	20 May 2022

This Certificate was issued to replace to Calibration Certificate No. 22-AFM-016

Issue Date: 11 February 2022

11 February 2022

FM-708-AFM-01 Rev.00 Issue date 01/07/19

FM-708-AFM-01 Rev.00 Issue date 01/07/1

๑-37

SOUND LEVEL CALIBRATOR

MODEL : NC-75

SERIAL No. : 34802645

Request No. 21-65/0018 MTC No. EEL. BP. 24/1064

CALIBRATION CERTIFICATE

Submitted by : Eastern Thai Consulting 1992 Co., Ltd.
Address : 683 Moo 11 Sukaphibal 8 Rd., Nongkham, Sriracha, Chonburi 20230.
Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
: Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :
Description : Sound Calibrator
Manufacturer : Rion
Model : NC-75
Serial No. : 34802645
Ambient Environment
Temperature : (23 ± 3) °C
Relative Humidity : (50 ± 15) %
Ambient Pressure : (101.325 ± 1.500) kPa

- Standards used :**
1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
 2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.
 3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.
 4. Digital Multimeter Agilent 34401A S/N MY44005560.
 5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
 6. Audio Analyzer Keithley 2015-P S/N 4106495.
 7. Condenser Microphone B&K 4180 S/N 2889871.

Calibration Procedure: CP-102-04 based on IEC 60942-2003; The sound pressure level generated by sound calibrator under test shall be measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 11 Oct. 2021
Date of Calibration : 21 Oct. 2021

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Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

Request No. 21-65/0018 MTC No. EEL. BP. 24/1064

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

Nominal Output of Unit Under Test = 94 dB re 20μPa at 1000 Hz

Acoustic Output in dB re 20μPa, Corrected to Reference Conditions: 101.325 kPa, 23.0 °C and 50 %RH.

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit
1/2 inch B&K 4180	93.97	-0.03	± 0.10	±0.40 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit
1/2 inch B&K 4180	1000.0	0.0	± 1.5	±1.0%

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit
1/2 inch B&K 4180	0.50	± 0.50	±3.0%

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

Approved by :

Date of Calibration : 21 Oct. 2021

Date of Issue : 26 Oct. 2021

End of Certificate

Ref: 201126410104187003

2 / 2

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E-mail : mtc@tistr.or.th

SOUND LEVEL METER

MODEL : NL-42

SERIAL No. : 01147298

1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Unit Under Test				Tolerance Limit Class 2 (±dB)
	Measured Value (dB)		Deviation (dB)	Uncertainty (±dB)	
	Before adjust	After adjust			
	113.97	114.2			

Note: The external calibration adjustment was firstly performed. The internal calibration adjustment was then completed at the display of 123.8 dB.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (±dB)
16.8	0.10

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured Value (dB)	Uncertainty (±dB)
A-Weighting	11.9	0.10
C-Weighting	17.3	0.10
Flat	22.5	0.10

Date of Calibration : 3 Mar. 2022

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3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from response curve			Uncertainty (±dB)	Tolerance Limits Class 2 (±dB)
	A-weighting (dB)	C-weighting (dB)	Flat (dB)		
125	-0.3	-0.2	-0.2	0.40	2.0
1 000	0.4	0.4	0.4	0.40	1.4
4 000	-1.1	-1.0	-1.1	0.40	3.6

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from response curve			Uncertainty (±dB)	Tolerance Limits Class 2 (±dB)
	A-weighting (dB)	C-weighting (dB)	Flat (dB)		
63	0.0	-0.1	-0.1	0.20	2.5
125	-0.1	0.0	-0.1	0.20	2.0
250	0.0	0.0	0.0	0.20	1.9
500	0.0	0.0	0.0	0.20	1.9
1 000	0.0	0.0	0.0	0.20	1.4
2 000	0.1	0.0	-0.1	0.20	2.6
4 000	0.0	0.0	-0.1	0.20	3.6
8 000	0.1	0.0	-0.1	0.20	5.6

Date of Calibration : 3 Mar. 2022

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5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Uncertainty (±dB)	Tolerance Limits Class 2 (±dB)
A-weighting	94.0	0.0	0.20	0.4
C-weighting	94.0	0.0	0.20	0.4
Flat	94.0	0.0	0.20	0.4

5.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Uncertainty (±dB)	Tolerance Limits Class 2 (±dB)
Fast	94.0	0.0	0.20	0.3
Slow	94.0	0.0	0.20	0.3
Leq	94.0	0.0	0.20	0.3

6. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Uncertainty (±dB)	Tolerance Limits Class 2 (±dB)
137	137.1	0.1	0.30	1.4
136	136.1	0.1	0.30	1.4
135	135.1	0.1	0.30	1.4
134	134.1	0.1	0.30	1.4
133	133.1	0.1	0.30	1.4
132	132.1	0.1	0.30	1.4
131	131.1	0.1	0.30	1.4

Date of Calibration : 3 Mar. 2022

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Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th

FM.BLMTC.002 Rev.4

6. Level linearity on the reference level range (con.)

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Uncertainty (±dB)	Tolerance Limits Class 2 (±dB)
130	130.1	0.1	0.30	1.4
129	129.0	0.0	0.30	1.4
124	124.0	0.0	0.30	1.4
119	119.1	0.1	0.30	1.4
114	114.1	0.1	0.30	1.4
109	109.0	0.0	0.30	1.4
104	104.1	0.1	0.30	1.4
99	99.0	0.0	0.30	1.4
94	94.0	0.0	0.30	1.4
89	89.0	0.0	0.30	1.4
84	84.1	0.1	0.30	1.4
79	79.1	0.1	0.30	1.4
74	74.0	0.0	0.30	1.4
69	69.0	0.0	0.30	1.4
64	64.0	0.0	0.30	1.4
59	59.0	0.0	0.30	1.4
54	54.0	0.0	0.30	1.4
49	49.0	0.0	0.30	1.4
44	44.0	0.0	0.30	1.4
39	39.0	0.0	0.30	1.4
34	34.0	0.0	0.30	1.4
29	29.0	0.0	0.30	1.4
28	28.0	0.0	0.30	1.4

Date of Calibration : 3 Mar. 2022

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FM.BLMTC.002 Rev.4

6. Level linearity on the reference level range (con.)

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Uncertainty (±dB)	Tolerance Limits Class 2 (±dB)
27	27.0	0.0	0.30	1.4
26	26.0	0.0	0.30	1.4
25	25.0	0.0	0.30	1.4

7. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Uncertainty (±dB)	Tolerance Limits Class 2 (±dB)
30-130	125	125.0	0.0	0.30	1.4

8. Tone burst response

Time Weighting	Toneburst Duration, Tb (ms)	Measured Value (dB)	Deviated Value (dB)	Uncertainty (±dB)	Tolerance Limits Class 2 (dB)
Fast	200	126.1	0.1	0.20	±1.3
	2	109.0	0.0	0.20	+1.3; -2.8
	0.25	99.9	-0.1	0.20	+1.8; -5.3
Slow	200	119.5	-0.1	0.20	±1.3
	2	100.0	0.0	0.20	+1.3; -5.3
	200	120.0	0.0	0.20	±1.3
SEL	2	100.0	0.0	0.20	+1.3; -2.8
	0.25	90.8	-0.2	0.20	±1.3; -6.2

Date of Calibration : 3 Mar. 2022

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Fax. (66) 0 2579 8592
E-mail : sunalee@tistr.or.th

FM.BL.MTC.002 Rev.4

9. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (±dB)	Tolerance limits Class 2 (±dB)
Complete cycle	125.4	125.2	-0.2	0.20	2.4
Positive half cycle	124.4	124.1	-0.3	0.20	1.4
Negative half cycle	124.4	124.1	-0.3	0.20	1.4

10. Overload Indication

Measured value (dB)		Deviated value (dB)	Uncertainty (±dB)	Tolerance Limits Class 2 (±dB)
Positive one-half cycle	Negative one-half cycle	0.0	0.30	1.8
131.9	131.9			

Ca

Appr

Date of Calibration : 3 Mar. 2022

Date of Issue : 4 Mar. 2022

End of Certificate

8 / 8

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Amphoe Muang, Changwat Samutprakan 10280, Thailand
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Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

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FM.BL.MTC.002 Rev.4

SOUND LEVEL METER

MODEL : NL-21

SERIAL No. : 00209072



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-65/0156 MTC No. EEL. BP. 29/1264

CALIBRATION CERTIFICATE

Submitted by : Eastern Thai Consulting 1992 Co., Ltd.
Address : 683 Moo 11 Sukaphibal 8 Rd., Nongkham, Sriracha, Chonburi 20230.
Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280.

Instrument Calibrated :	
Description	: Sound Level Meter
Manufacturer	: Rion
Model	: NL-21
Serial No.	: 00209072 (No.16)
Microphone	: Type UC-52 No.128251
Preamplifier	: Type NH-21 No.32087
Standards used :	
1. Band Pass Filter Wavetek 752A S/N 90010494.	
2. Condenser Microphone Brüel&Kjær 4180 S/N 2633526.	
3. Decade Attenuator Ando AL-205 S/N 00464602.	
4. Function/Arbitrary Waveform Generator Agilent 33220A S/N MY44042668.	
5. Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 122037.	
6. Digital Multimeter Fluke 8520A S/N 4985007.	
7. Pistonphone Rion NC-72 S/N 00402446.	
8. Measuring Amplifier Brüel&Kjær 2636 S/N 1537484.	

Ambient Environment

Temperature : (23 ± 3) °C

Relative Humidity : (50 ± 15) %

Ambient Pressure : (101.325±1.5) kPa

Calibration Procedure :

This instrument was calibrated by using calibration procedures no CP-102-02 and CP-102-03, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3 : Periodic tests (2006). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

This instrument has been calibrated against standards maintained at the Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

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

Date of Receipt : 3 Dec. 2021

Date of Calibration : 7 Jan. 2022

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FM.BLMTC.002 Rev.4

1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Unit Under Test				Tolerance Limit Class 2 (±dB)
	Measured Value (dB)		Deviation (dB)	Uncertainty (±dB)	
	Before adjust	After adjust			
113.98	113.9	114.0	0.0	0.30	1.4

Note: The external calibration adjustment was firstly performed. The internal calibration adjustment was then completed at the display of 116.5 dB.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (±dB)
19.5	0.10

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured Value (dB)	Uncertainty (±dB)
A-Weighting	15.5	0.80
C-Weighting	21.5	1.30
Flat	23.8	0.10

Date of Calibration : 7 Jan. 2022

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3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from response curve			Uncertainty (±dB)	Tolerance Limits Class 2 (±dB)
	A-weighting (dB)	C-weighting (dB)	Flat (dB)		
125	-0.1	0.0	0.0	0.40	2.0
1 000	-0.1	-0.1	-0.1	0.40	1.4
4 000	-1.0	-0.9	-0.9	0.40	3.6

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from response curve			Uncertainty (±dB)	Tolerance Limits Class 2 (±dB)
	A-weighting (dB)	C-weighting (dB)	Flat (dB)		
63	0.0	-0.1	-0.2	0.30	2.5
125	-0.1	-0.1	-0.2	0.30	2.0
250	0.0	-0.1	0.0	0.30	1.9
500	0.0	0.0	0.0	0.30	1.9
1 000	0.0	0.0	0.0	0.30	1.4
2 000	0.1	0.0	0.1	0.30	2.6
4 000	0.1	0.0	0.1	0.30	3.6
8 000	0.3	0.2	0.0	0.30	5.6

Date of Calibration : 7 Jan. 2022

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5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Uncertainty (±dB)	Tolerance Limits Class 2 (±dB)
A-weighting	94.0	0.0	0.20	0.4
C-weighting	94.0	0.0	0.20	0.4
Flat	94.0	0.0	0.20	0.4

5.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Uncertainty (±dB)	Tolerance Limits Class 2 (±dB)
Fast	94.0	0.0	0.20	0.3
Slow	94.0	0.0	0.20	0.3
Leq	94.0	0.0	0.20	0.3

6. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Uncertainty (±dB)	Tolerance Limits Class 2 (±dB)
125	125.0	0.0	0.30	1.4
124	124.0	0.0	0.30	1.4
123	123.0	0.0	0.30	1.4
122	122.0	0.0	0.30	1.4
121	121.0	0.0	0.30	1.4
120	120.0	0.0	0.30	1.4
119	119.0	0.0	0.30	1.4
114	114.0	0.0	0.30	1.4
109	109.0	0.0	0.30	1.4

Date of Calibration : 7 Jan. 2022

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6. Level linearity on the reference level range (con.)

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Uncertainty (±dB)	Tolerance Limits Class 2 (±dB)
104	104.0	0.0	0.30	1.4
99	99.0	0.0	0.30	1.4
94	94.0	0.0	0.30	1.4
89	89.0	0.0	0.30	1.4
84	84.1	0.1	0.30	1.4
79	79.1	0.1	0.30	1.4
74	74.0	0.0	0.30	1.4
69	69.0	0.0	0.30	1.4
64	64.0	0.0	0.30	1.4
59	59.0	0.0	0.30	1.4
54	54.0	0.0	0.30	1.4
49	49.0	0.0	0.30	1.4
44	44.0	0.0	0.30	1.4
39	38.9	-0.1	0.30	1.4
34	33.9	-0.1	0.30	1.4
33	33.0	0.0	0.30	1.4
32	31.9	-0.1	0.30	1.4
31	31.0	0.0	0.30	1.4
30	29.9	-0.1	0.30	1.4
29	28.9	-0.1	0.30	1.4
28	27.8	-0.2	0.30	1.4

Date of Calibration : 7 Jan. 2022

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7. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Uncertainty (±dB)	Tolerance Limits Class 2 (±dB)
40-130	125	125.0	0.0	0.30	1.4
30-120	115	115.0	0.0	0.30	1.4
20-110	105	104.9	-0.1	0.30	1.4
20-100	95	94.9	-0.1	0.30	1.4
20-90	85	85.0	0.0	0.30	1.4
20-80	75	75.0	0.0	0.30	1.4

8. Tone burst response

Time Weighting	Toneburst Duration, Tb (ms)	Measured Value (dB)	Deviated Value (dB)	Uncertainty (±dB)	Tolerance Limits Class 2 (dB)
Fast	200	116.0	0.0	0.20	±1.3
	2	98.9	-0.1	0.20	+1.3; -2.8
	0.25	89.8	-0.2	0.20	+1.8; -5.3
Slow	200	109.5	-0.1	0.20	±1.3
	2	89.9	-0.1	0.20	+1.3; -5.3
	200	110.0	0.0	0.20	±1.3
SEL	2	89.9	-0.1	0.20	+1.3; -2.8
	0.25	80.8	-0.2	0.20	+1.8; -5.3

Date of Calibration : 7 Jan. 2022

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FM.BLMTC.002 Rev.1

9. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (±dB)	Tolerance limits Class 2 (±dB)
Complete cycle	125.4	125.0	-0.4	0.20	2.4
Positive half cycle	124.4	124.1	-0.3	0.20	1.4
Negative half cycle	124.4	124.1	-0.3	0.20	1.4

10. Overload indication

Measured value (dB)		Deviated value (dB)		Uncertainty (±dB)		Tolerance Limits Class 2 (±dB)	
Positive one-half cycle	Negative one-half cycle						
135.7	135.6	0.1		0.30		1.8	

App

Date of Calibration : 7 Jan. 2022

Date of Issue : 7 Jan. 2022

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FM.BLMTC.002 Rev.4

ANALYTICAL BALANCE (DU)

Model : XS205 DU


Serial No. : 1126323724

Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5 Lamsalle Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10260
+66 2723 0382
MT-TH.ServiceSupport@mt.com



Accuracy Calibration Certificate

Customer

Company: EASTERN THAI CONSULTING 1992 CO., LTD.
Address: 683 Moo 11, Sukhaphibun 8 Rd., Nong Kham
City: Siracha
Zip / Postal: 20230
State / Province: Chonburi
Order Number: 

Weighing Device

Manufacturer: Mettler-Toledo
Model: XS205DU
Serial No.: 1128323724
Building: Laboratory
Floor: 1
Room: Laboratory
Instrument Type: Weighing Instrument
Asset Number: LABE 05/1
Terminal Model: SAT
Terminal Serial No.: 1128323724
Terminal Asset No.: N/A

Range	Max. Capacity	Repeatability (g)
1	81 g	0.0001 g
2	220 g	0.0001 g

Procedure

Calibration Guideline: EURAMET cg-18 v. 4.0 (11/2015)
CP/W002/20
This calibration certificate contains measurements for As Found calibration. No As Left calibration was performed because the device was not modified after As Found calibration. Therefore, results for As Left correspond to As Found.
The sensitivity/span of the weighing instrument was adjusted before calibration with a built-in weight.
In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

As Found	Temperature		Humidity	
	Start: 26.9 °C	End: 26.8 °C	Start: 73.8 %	End: 71.9 %

As Found Calibration Date: 22-Jul-2021
As Left Calibration Date: N/A
Issue Date: 23-Jul-2021
Approved Signatory:

Measurement Results

Repeatability

Test Load: 70 g			As Found	As Left
1	89.9998 g	N/A	N/A	N/A
2	89.9997 g	N/A	N/A	N/A
3	89.9997 g	N/A	N/A	N/A
4	89.9998 g	N/A	N/A	N/A
5	89.9997 g	N/A	N/A	N/A
6	89.9998 g	N/A	N/A	N/A
7	89.9999 g	N/A	N/A	N/A
8	89.9998 g	N/A	N/A	N/A
9	89.9997 g	N/A	N/A	N/A
10	89.9999 g	N/A	N/A	N/A
Standard Deviation			0.000008 g	N/A

The "d" in the graph represents the repeatability of the range/interval in which the test was performed.
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	99.9999 g	N/A
2	99.9998 g	N/A
3	99.9998 g	N/A
4	100.0000 g	N/A
5	100.0000 g	N/A
Maximum Deviation		0.0001 g

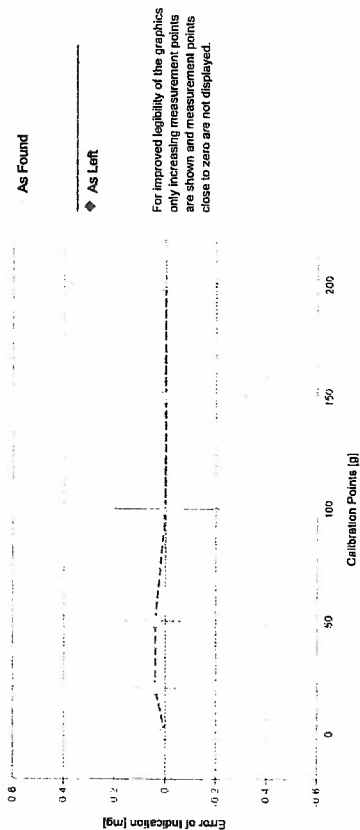
As Found	
2	1d
3	-1d
4	1d
5	1d

The "d" in the graph represents the repeatability of the range/interval in which the test was performed.

Error of Indication

As Found	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.00000 g	0.00000 g	0.00000 g	0.017 mg	2
2	0.01000 g	0.01000 g	0.00000 g	0.019 mg	2
3	0.10000 g	0.09999 g	-0.00001 g	0.023 mg	2
4	1.00000 g	1.00000 g	0.00000 g	0.032 mg	2
5	4.99999 g	5.00000 g	0.00002 g	0.048 mg	2
6	9.99999 g	10.00001 g	0.00002 g	0.061 mg	2
7	20.00001 g	20.00005 g	0.00004 g	0.082 mg	2
8*	49.99993 g	49.99997 g	0.00004 g	0.12 mg	2
9	99.99999 g	99.99999 g	0.00000 g	0.21 mg	2
10	149.9998 g	149.9998 g	0.00000 g	0.32 mg	2
11	199.9998 g	199.9998 g	0.00000 g	0.37 mg	2

*The calculated uncertainty was replaced by the CMC (Calibration and Measurement Capabilities) value because the calculated uncertainty was smaller than the CMC value.



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor k – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML E2	WS28	Date of Issue:	17-Nov-2020
Weight Set No.:	170241	Calibration Due Date:	15-May-2022
Certificate Number:	170241		
Thermo Hygrometer	IN51	Date of Issue:	02-Mar-2021
Equipment No.:	21H403	Calibration Due Date:	23-Feb-2022
Certificate Number:	21H403		

Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with $k=2$ in use. This formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: $1.5 \cdot 10^{-5} / K$
Temperature range on site for the evaluation of the measurement uncertainty in use: 5 K

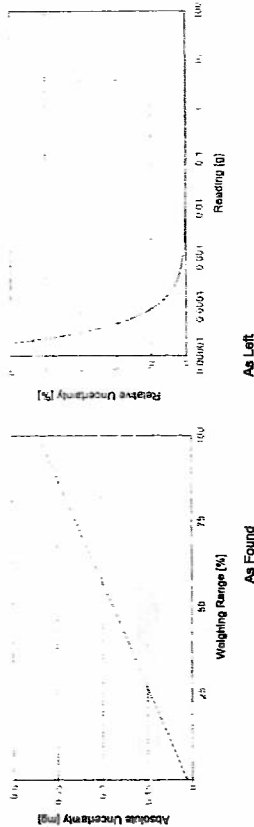
Linearization of Uncertainty Equation

Range		As Found		As Left	
d	Max				
1	0.00001 g	81 g	$U_1 = 0.018 \text{ mg} + 0.00608 \text{ mg/g} \cdot R$	N/A	
2	0.0001 g	220 g	$U_2 = 0.08 \text{ mg} + 0.00603 \text{ mg/g} \cdot R$	N/A	

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Net Indication	As Found	As Left
0.00220 g	0.018 mg	0.82%
0.02200 g	0.018 mg	0.092%
0.22000 g	0.019 mg	0.0088%
2.20000 g	0.031 mg	0.0014%
220.0000 g	1.4 mg	0.00063%



The weighing range shown in the absolute uncertainty graph refers to the first interval/range of the device.



GWP® Certificate

As Found



As Left



The weighing device meets the given process requirements.

The weighing device meets the given process requirements.

Tests Performed:



As Found



As Left

No adjustments/modifications made. As Left results correspond to As Found.

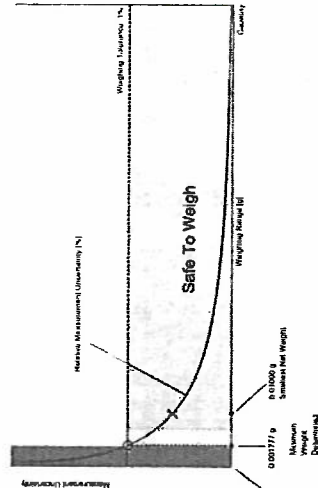
Process Requirements

Weighing Tolerance: 1%

Smallest Net Weight: 0.01000 g

Safety Factor: 2

Safe Weighing Range



While the values in this graph reflect the actual calibration results, the measurement uncertainty curves are simply a visual representation. This graph reflects As Left testing, unless only As Found was performed.

Minimum Weight

As Found Minimum Weight Table

Range 1

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.017873 g	0.035965 g	0.054282 g	0.091605 g	0.189140 g
0.2%	0.008909 g	0.017873 g	0.026891 g	0.045095 g	0.091605 g
0.5%	0.003557 g	0.007123 g	0.010697 g	0.017873 g	0.035965 g
1%	0.001777 g	0.003557 g	0.005339 g	0.008909 g	0.017873 g
2%	0.000888 g	0.001777 g	0.002687 g	0.004448 g	0.008909 g
5%	0.000355 g	0.000711 g	0.001066 g	0.001777 g	0.003557 g

The minimum weight table applies to the fine range of the weighing device.

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

As Left Minimum Weight Table

Range 1

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.017873 g	0.035965 g	0.054282 g	0.091605 g	0.189140 g
0.2%	0.008909 g	0.017873 g	0.026891 g	0.045095 g	0.091605 g
0.5%	0.003557 g	0.007123 g	0.010697 g	0.017873 g	0.035965 g
1%	0.001777 g	0.003557 g	0.005339 g	0.008909 g	0.017873 g
2%	0.000888 g	0.001777 g	0.002687 g	0.004448 g	0.008909 g
5%	0.000355 g	0.000711 g	0.001066 g	0.001777 g	0.003557 g

The minimum weight table applies to the fine range of the weighing device.

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1/1 (no safety factor), 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with $k = 2$ and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

Measurement Results

Results Summary

Repeatability		Eccentricity	Error of Indication
As Found	As Left		
✓	✓	✓	✓

✓ = Passed
✗ = Failed
A = Safety Factor not met

Repeatability

Test Load: 70 g

As Found		As Left	
Tolerance	Control Limit	Std. Deviation	Result
0.1%	0.000005 g		✗
0.2%	0.000010 g		✓
0.5%	0.000025 g		✓
1%	0.000050 g	0.000008 g	✓
2%	0.000100 g		✓
5%	0.000250 g		✓

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

Eccentricity

Test Load: 100 g

As Found		As Left	
Tolerance	Control Limit	Std. Deviation	Result
0.1%	0.0500 g		✓
0.2%	0.1000 g		✓
0.5%	0.2500 g		✓
1%	0.5000 g	0.0001 g	✓
2%	1.0000 g		✓
5%	2.5000 g		✓

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

As Found

Reference Value	Error	Control limits for various weighing tolerances					Result
		0.1%	0.2%	0.5%	1%	5%	
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	✓
20.00001 g	0.00004 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g
49.99993 g	0.00004 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g
99.99999 g	0.00000 g	0.05000 g	0.10000 g	0.25000 g	0.50000 g	1.00000 g	2.50000 g
149.99998 g	0.00000 g	0.07500 g	0.15000 g	0.37500 g	0.75000 g	1.50000 g	3.75000 g
199.99998 g	0.00000 g	0.10000 g	0.20000 g	0.50000 g	1.00000 g	2.00000 g	5.00000 g
Result		✓	✓	✓	✓	✓	✓

As Left

Reference Value	Error	Control limits for various weighing tolerances					Result
		0.1%	0.2%	0.5%	1%	5%	
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	✓
20.00001 g	0.00004 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g
49.99993 g	0.00004 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g
99.99999 g	0.00000 g	0.05000 g	0.10000 g	0.25000 g	0.50000 g	1.00000 g	2.50000 g
149.99998 g	0.00000 g	0.07500 g	0.15000 g	0.37500 g	0.75000 g	1.50000 g	3.75000 g
199.99998 g	0.00000 g	0.10000 g	0.20000 g	0.50000 g	1.00000 g	2.00000 g	5.00000 g
Result		✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.

Service Date: 2021-07-22
Document Number: TH2046-042-072221-LABBalanceHR
EASTERN THAI CONSULTING 1992 CO., LTD.
693 Moo 11, Suksepahan 8 Rd., Nong Khai, Sriracha, Chonburi 20230
Sriajorn Nalin

METTLER TOLEDO

Balance Health Report

Device Details		System Details	
Manufacturer:	Mettler Toledo	Accessory 1:	
Model:	XS205DU	Accessory 2:	
Serial number:	1128323724	Weight set for routine testing:	Yes /
Firmware:	4.00 / 5.61		
History		Service History	
Instrument in use:	Yes	Last preventive maintenance:	< 1 year
Instrument age:	> 10 years	Last instrument calibration:	< 1 year
Spare parts available:	Yes	Last minimum weight determination:	Never
Regulations:	ISO		
Process tolerance in %:	1%	Routine testing performed:	Yes
Smallest sample net weight:	0.01000 g		
Check List			
Environmental Conditions		General & Functional Checks	
Room temperature fluctuation	✓	Leveling	✓
Exposure to direct sun	✓	Cleanliness	✓
Vibrations	✓	Completeness - missing parts see additional remarks	✓
Draft	✓	Settings optimized for operating environment	✓
Dirt or dust	✓	Other - objections noted as additional remarks	✓
Static	✓	Electrical Component Checks	
Mechanical Component Checks		Power supply	✓
Draft shield	✓	Sliding door drive	✓
Weighting pan position	✓	Internal weight drive	✓
Housing	✓	Display	✓
Other - objections noted as additional remarks	✓	Other - objections noted as additional remarks	✓
Recommendations			
Maintenance / Repair Quality		Problem Efficiency	
Instrument calibration		Uninstall instrument	
Identify safe weighing range		Replace instrument	
GMP verification / risk assessment	Yes	Replace / add parts (see additional remarks)	
Preventive maintenance		Onsite repair	
Perform routine testing with test weights		Depot repair	
User training		Use of accessories (see additional remarks)	
Contact	Name: Sasiporn Nalin	Position:	Phone: 090513303
			Email: co.jes@metro.com
Additional Remarks & Recommendations			
Engineer Details			

This is not a certificate.
It should not be used to interpret final results for the testing of these devices.

Legend: ✓ Good/Pass ⚠ Needs Attention ✗ Bad/Fail — Not Applicable

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MT-TH-Service@metro.com
www.mt.com

METTLER TOLEDO Service
Report Version: 1.13 Software Version: 4.28.0.3, Page: 1/1, © METTLER TOLEDO

ANALYTICAL BALANCE

Model : SECURA224-1S

Serial No. : 0036707137



Certificate No. : 22-011768

Sample Code : 22-04498-005

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.

683 Moo 11, Sukhapibon 8 Rd., Nongkham,

Sriracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.

(Analytical Balance Room)

Equipment : ELECTRONIC BALANCE

Manufacturer : SARTORIUS

Model : SECURA224-1S

Serial No. : 0036707137

ID No. : LABE 05/2

Date of Receipt : 03 February 2022

Date of Calibration : 03 February 2022

Calibrated by [REDACTED] Approved by

Issue date : 07 February 2022

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

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FM-CL-017

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FAX 02-516-5949

Rev.05

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WWW.AMARC.CO.TH

Effective Date: 15/10/21



Certificate No. : 22-011768

Sample Code : 22-04498-005

REPORT OF CALIBRATION

Equipment : ELECTRONIC BALANCE

Manufacturer : SARTORIUS

Model : SECURA224-1S

Capacity : Max 220 g

Resolution : 0.0001 g

Serial No. : 0036707137

ID No. : LABE 05/2

Result of Calibration

1. Test weight and repeatability of reading

Repeatability is a measure of the ability of a balance to supply the same result in repetitive weighings with one and the same load under the same measurement condition. The measurement of the repeatability must include both the balance specifications and the ambient (vibration, fluctuating air current/temperature/humidity, etc.) Operator handling of the balance is also included in the standard deviation.

Unit : g	Range : 220				
<input type="checkbox"/> No adjustment	Nominal value	100	200	100	200
<input checked="" type="checkbox"/> Adjustment	Standard weight	100.000022	200.0000141	100.000022	200.000141
	Average reading of Indicator	99.9998	199.9998	100.0000	200.0000
	Standard deviation	0.00008	0.00005	0.00005	0.00004

Unit : -	Range : -				
<input type="checkbox"/> No adjustment	Nominal value	-	-	-	-
<input type="checkbox"/> Adjustment	Standard weight	-	-	-	-
	Average reading of Indicator	-	-	-	-
	Standard deviation	-	-	-	-

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Effective Date: 15/10/21

Certificate No. : 22-011768

Sample Code : 22-04498-005

Page 3 of 4

REPORT OF CALIBRATION

Result of Calibration

2. Sensitivity or value of a scale division

Change in the output variable of a measuring instrument divided by the associated change in the input variable.

Unit : g

Range : 220			
Test Point	Sensitivity, S	Test Point	Sensitivity, S
0	0.7981	-	-
100	0.9976	-	-
200	0.9976	-	-

3. Departure of indication from nominal value, Linearity

Unit : g

Nominal Value	Standard Value	Average Reading of Indicator	Correction Value	Expanded Uncertainty	Coverage Factor (k)
Unload	0.0000000	0.0000	0.0000	0.000094	2.01
0.01	0.0100045	0.0100	0.0000	0.000094	2.01
0.1	0.1000102	0.1000	0.0000	0.000094	2.01
1	1.0000055	1.0000	0.0000	0.000095	2.01
2	2.0000144	1.9999	0.0001	0.000095	2.01
5	5.0000060	5.0000	0.0000	0.000096	2.01
10	10.0000017	9.9999	0.0001	0.000097	2.01
20	20.0000022	20.0000	0.0000	0.00010	2.01
50	50.0000038	50.0000	0.0000	0.00012	2.01
100	100.0000022	99.9999	0.0001	0.00016	2.00
200	200.0000141	200.0000	0.0001	0.00027	2.00

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k, which for a normal distribution corresponds to a measurement reliability of approximately 95%. The standard uncertainty of measurement is stated as follows:

Certificate No. : 22-011768

Sample Code : 22-04498-005

Page 4 of 4

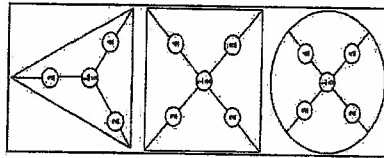
REPORT OF CALIBRATION

Result of Calibration :

4. Eccentric or off-centre loading

Deviation of the measurement value through off - center (eccentric) loading. The corner load increases with the weight of the load and its removal from the center of the pan support.

Weighing pan			
<input checked="" type="radio"/> Circle	<input type="radio"/> Triangular	Test weight : 100	
<input type="radio"/> Rectangular		Unit : g	
Range	Position	Reading of indicator	Reading of Indicator
220			
1		99.9999	-
2		100.0000	-
3		99.9999	-
4		99.9997	-
5		100.0000	-
6		99.9999	-
Maximum difference		0.0002	-



Condition of Calibration

1. Calibration Method : WI-CL-004 base on UKAS LAB 14: 2019
2. This result of calibration was found accurate as shown on date and place of calibration only.
3. Condition of Calibration item: Normal
4. This certification is traceable to the International System of Unit maintained at : -
Through the reference standard laboratory of Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (Instrument number 1).
5. Reference standard instrument :

Ambient conditions	Min	Max
Temperature (°C)	24.9	26.7
Relative Humidity (%RH)	40.3	55.6
Air pressure (hPa)	1009.3	1010.7

Instrument

Class ID No.
E2 LB-WE-57

Due Date

- End of Report -

BAROMETER

Equipment : Analog Barometer

ID No. / Tag No. : BM001/41



MIRACLE INTERNATIONAL TECHNOLOGY CO., LTD
214 Bangwaek Rd. Bangpui Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Certificate No. : AD2106-032-0001

Date Issued : 04-Jun-21

Customer : Eastern Thai Consulting 1992 Co., Ltd.
683 Moo 11 Sukhapiarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

Equipment : Analog Barometer

Manufacturer : Barigo
Model : -
Serial No. : -
ID No./Tag No. : BM001/41
Date Received : 02-Jun-21
Date Calibrated : 04-Jun-21

Calibrated by : [REDACTED]

Calibration Method or Calibration Procedure Used

In-house method : CP-21 base on DKD-R 6-1: Edition 3 2014.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Technical Manager, Miracle International Technology Company Limited.

Approved by :



Page 1 of 2

Certificate No. : AD2106-032-0001

Environment : Ambient Temperature : (25 ± 2)°C

Relative Humidity : (50 ± 15)%RH

STD Reading hPa	UUC Reading (hPa) Before Adjusted	UUC Reading (hPa) After Adjusted	UUC Error hPa	Uncertainty ± hPa
990.00	990.0	-	0.00	0.91
1000.00	1000.0	-	0.00	0.91
1010.00	1010.0	-	0.00	0.91
1020.00	1020.0	-	0.00	0.91
1030.00	1030.0	-	0.00	0.91

STD = Standard

UUC = Unit Under Calibration

Calibrated condition :

Pressure Medium
Mounting Position
Reference Level

Air : Density = 1.19 kg/m³ @ 20°C, 1 bar
Vertical
at center of its dial

Description of UUC :

Range : 955 - 1075 hPa Absolute
Calibration Range : 990 - 1030 hPa Absolute
Scale Interval : 1 hPa
Resolution : 0.5 hPa Absolute

Measurement Standards Used & Traceability :

The International System of Units (SI) through

IRPC Certificate No. CL1-P210029 for Digital Barometer Serial No. 290185, Due 19-Oct-21

End of Certificate

Page 2 of 2

BOD INCUBATOR

ID No. : LABE 19/1



CERTIFICATE OF CALIBRATION

Page 1 of 3

Certificate No. : 22-011784
Sample Code : 22-04498-001

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhepiban 8 Rd., Nongkham,
Sirachha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Laboratory)

Equipment : Temperature controlled enclosures (Incubator)
Manufacturer : N/A
Model : E811.0308
Serial No. : N/A
ID No. : LABE19/1
Date of Receipt : 03 February 2022
Date of Calibration : 03 February 2022

Condition of Calibration

1. Environment
1.1 Ambient temperature : Maximum 30.5 °C ; Minimum 29.5 °C
1.2 Relative humidity : Maximum 50.8 % ; Minimum 48.4 %
1.3 Line voltage supplied : Maximum 224.3 VAC ; Minimum 222.5 VAC

2. Calibration method

2.1 TLAS-G-20: Guidelines for calibration and checks of temperature controlled enclosures.

3. Reference standard instrument

Instrument	ID No.	Certificate No.	Due Date
Date Acquisition With Sensor (RTD-PT100)	LB-DA-11 (RTD-138 to RTD-146)	21-035792	18 May 2022

4. This certificate is traceable to the International system of unit (SI Unit).

The measurement is traceable to Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.

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

6. Condition of calibration item : Normal

Calibrated by

Approved by

Issue date

11 February 2022

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

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Effective Date: 15/10/21



REPORT OF CALIBRATION

Page 2 of 3

Certificate No. : 22-011784
Sample Code : 22-04498-001

Results of Calibration

Resolution : 0.1 °C

1. Reporting of Temperature

Calibration point (°C)	UUC* setting (°C)	UUC* reading (°C)	Measured temperature at each positions (°C)								Uncertainty ± (°C)	Coverage factor k	
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8			# 9 nd
20	20.0	20.0	20.61	20.09	19.46	19.73	20.22	20.37	20.12	20.19	20.28	0.29	2.00

2. Characterization results

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
20	0.09	0.88	1.26

Notes

- UUC* = Unit Under Calibration

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Effective Date: 15/10/21

NSC-TSI-TS17025
CALIBRATION 0152

REPORT OF CALIBRATION

Page 3 of 3

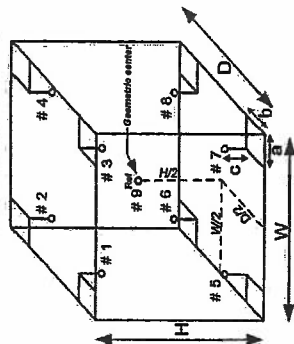
Certificate No. : 22-011764

Sample Code : 22-04498-001

Results of Calibration

Notes

1. Sensor installation locations
 - 1.1 All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
 - 1.2 The reference sensor is preferably located of the geometric center of the chamber.
2. Interior dimensions approx of chamber :
W = 70 cm; D = 60 cm; H = 124 cm
3. Air valve or fresh air level : Off
4. Fan level : Open
5. The quoted uncertainty includes "Stability of chamber and loading effect in chamber at 20% of uniformity".
6. 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.
7. Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.
8. Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.
9. UUC* reading - the average reading of indicating device that forms the Integral part of the enclosure.
10. Calibration results without adjustment.

Figure: Example of sensor
Installation Positions

The result expanded uncertainty of measurement U is stated as the standard uncertainty multiplied by the coverage factor k , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with ISO 91.

- End of Report -

BOD INCUBATOR

ID No. : LABE 19/2



AMARC

REPORT OF CALIBRATION

Certificate No. : 22-007487
Sample Code : 22-02878-006

Results of Calibration

Resolution : 0.1 °C

1. Reporting of Temperature

Calibration point (°C)	UUC* setting (°C)	UUC* reading (°C)	Measured temperature at each positions (°C)								Uncertainty ± (°C)	Coverage factor <i>k</i>	
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8			# 9 ^{ref}
20	20.0	20.0	19.61	19.35	19.81	19.37	20.15	20.34	20.14	20.45	19.61	0.30	2.00

2. Characterization results

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
20	0.08	0.94	1.22

Notes

UUC* = Unit Under Calibration



AMARC

CERTIFICATE OF CALIBRATION

Certificate No. : 22-007487
Sample Code : 22-02878-006

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.

683 Moo 11, Sukhapiban 8 Rd., Nongkham,
Sriacha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Laboratory)

Equipment : Temperature controlled enclosures (Incubator)

Manufacturer : N/A Model : N/A

Serial No. : S540040277 ID No. : LABE 19/2

Date of Receipt : 24 January 2022 Date of Calibration : 24 January 2022

Condition of Calibration

1. Environment	1.1 Ambient temperature	Maximum : 30.4 °C ; Minimum : 30.0 °C
	1.2 Relative humidity	Maximum : 51.2 % ; Minimum : 46.2 %
	1.3 Line voltage supplied	Maximum : 225.3 VAC ; Minimum : 224.1 VAC

2. Calibration method

2. TLAS-G-20: Guidelines for calibration and checks of temperature controlled enclosures.

3. Reference standard instrument

Instrument	ID No.	Certificate No.	Due Date
Date acquisition with sensor (RTD-PH00)	LB-DA-12 (RTD-158 to RTD-166)	21-038920	10 May 2022

4. This certificate is traceable to the International system of unit (SI Unit).

The measurement is traceable to Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.

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

6. Condition of calibration item : Normal

Calibrated by

Approved by

Issue date

28 January 2022

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

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NSC-TIS-11517025
CALIBRATION 0152

Page 3 of 3

Certificate No. : 22-007487

Sample Code : 22-02978-006

REPORT OF CALIBRATION

Results of Calibration

Notes

1. Sensor Installation locations

1.1 All sensors at any corners or walls should be positioned
5 cm (a x b x c) from the wall.

1.2 The reference sensor is preferably located of the geometric center
of the chamber.

2. Interior dimensions approx of chamber :

W = 60 cm ; D = 70 cm ; H = 124 cm

3. Air valve or fresh air level : Off

4. Fan level : Open

5. The quoted uncertainty includes "Stability of chamber and loading effect
in chamber at 20% of uniformity".

6. 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.

7. Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

8. Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.

9. UUC* reading - the average reading of indicating device that forms the integral part of the enclosure.

10. Calibration results without adjustment.

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k , which for
corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M

- End of Report -

CONDUCTIVITY METER

Type : SevenCompact[™] Conductivity meter S230

Serial No. : B744909989

Certificate Number CCP-0832-21

Calibration Certificate SevenCompact™ Conductivity meter S230

Customer

Company EASTERN THAI CONSULTING 1992 CO., LTD.
Address 683 Moo 11, Sukhaphiban 8 Rd.,
Nong Klum, Sriracha
Chonburi 20230

Customer ID number 301608441

Customer representative

Order Number

Instrument

Type SevenCompact™ S230 Instrument Serial Number 874489989
Internal Identification LABEL 1312 Firmware version 2.01.03

Technical specifications

Measuring Range 0.001 µS/cm ... 1000 mS/cm
Resolution Auto range
Limit of Error 0.5%

Temperature range ITC -30.0 ... 130.0 °C
Temperature range ATC -5.0 ... 130.0 °C
Resolution 0.1 °C
Limit of Error ± 0.1 °C

Procedure Statement

METTLER TOLEDO Calibration SOP (Doc. No. 30027577) will be used as referring documentation to adjust and certify the instrument indicated in the "Type" and "Serial number" section. The measurement results of this certification were obtained at ambient conditions.

Certificate Number CCP-0832-21

Certification Tools

Certified Conductivity Resistors

Manufacturer: METTLER TOLEDO / ME-511
Control No: ANA25
Due date: December 3, 2021

Serial number: 9020
Certificate number: 52541

Designation	Nominal value	Certified value
Conductivity 10 Ω	10.0000 Ω	10.0041 Ω
Conductivity 150 Ω	150.0000 Ω	150.0718 Ω
Conductivity 1.5 kΩ	1.5000 kΩ	1.4993 kΩ
Conductivity 15 kΩ	15.0000 kΩ	15.0067 kΩ
Conductivity 150 kΩ	150.00 kΩ	149.975 kΩ
Conductivity 1 MΩ	1.0000 MΩ	1.0000 MΩ

Certified Temperature Resistors

Manufacturer: METTLER TOLEDO / ME-511
Control No: IN66
Due date: December 3, 2021

Serial number: A116
Certificate number: 52542

Designation	Nominal value	Certified value
NTC 30 kΩ, 0 °C	1.00000 kΩ	1.000075 kΩ
NTC 30 kΩ, 25 °C	1.09735 kΩ	1 kΩ
NTC 30 kΩ, 50 °C	1.18987 kΩ	1.19 kΩ
NTC 30 kΩ, 75 °C	1.28587 kΩ	1.29 kΩ
NTC 30 kΩ, 100 °C	1.38508 kΩ	1.39 kΩ

Certificate Number CCP-0832-21

Certification Measurements

Designation	Certified value	Measured value	Max. Tolerance	Passed / Failed
10 Ω	10.0041 Ω	10.00 Ω	0.5 %	Passed
150 Ω	150.072 Ω	150.1 Ω	0.5 %	Passed
1.5 kΩ	1.4993 kΩ	1.499 kΩ	0.5 %	Passed
15 kΩ	15.0067 kΩ	15.00 kΩ	0.5 %	Passed
150 kΩ	149.978 kΩ	149.9 kΩ	0.5 %	Passed
1 MΩ	1.0000 MΩ	1.000 MΩ	0.5 %	Passed

Designation	Nominal value	Measured value	Max. Tolerance	Passed / Failed
NTC 30 kΩ, 0 °C	0.0 °C	0.0 °C	0.1 °C	Passed
NTC 30 kΩ, 25 °C	25.0 °C	25.0 °C	0.1 °C	Passed
NTC 30 kΩ, 50 °C	50.0 °C	50.0 °C	0.1 °C	Passed
NTC 30 kΩ, 75 °C	75.0 °C	75.0 °C	0.1 °C	Passed
NTC 30 kΩ, 100 °C	100.0 °C	100.0 °C	0.1 °C	Passed

Summary of Certification

Certification of instrument

Passed

The instrument referred to in this certificate has fulfilled the criteria of the certification. This is indicated by the notation Passed in the column above.

Remarks

Certification of the instrument was performed by

Name		Function	Service Engineer
Place	Laboratory room		
Calibration Date:	July 22, 2021	Signature	ELECTRONIC SIGNATURE

Mettler-Toledo (Thailand) Limited

METTLER TOLEDO

Performance Test

Control No. CCE-0832-21/1

Company:	EASTERN THAI CONSULTING 1992 CO., LTD.
Address:	663 Moo 11, Sukhaphiban 8 Rd., Nong Kham, Sriracha Chonburi 20230
Order Number	"0332194694"
Conductivity Electrode	
Type:	InLab 731-ISM
S/N:	9819430128

Certified standards used

Standard 1:	Type: Conductivity Buffer	Manufacturer: METTLER TOLEDO	Exp. date: Jan-23
	Nominal value: (25.00 °C):	1413 uS/cm	Lot No.: 1G009A
Standard 2:	Type: Conductivity Buffer	Manufacturer: METTLER TOLEDO	Exp. date: Jan-23
	Nominal value: (25.00 °C):	12.88 mS/cm	Lot No.: 1G004I
Test equipment:	Type: Conductivity Meter	Manufacturer: METTLER TOLEDO	Cal date: 22-Jul-21
	S/N: B744809989	No. of certificate: CCP-0832-21	Model: S230

Cell Constant

Nominal	Old (cm ⁻¹)	New (cm ⁻¹)
1413 uS/cm	0.537562	0.560524

Measurements (Reference Temperature: 25 °C and Temperature correction is 2.00 % / °C)

Before adjustment			After adjustment		
Buffer Values	Measured	Difference	Buffer Values	Measured	Difference
1410 uS/cm	25.5 °C	1358	1410 uS/cm	25.4 °C	1408
12.89 mS/cm	25.5 °C	12.28	12.89 mS/cm	25.4 °C	12.73

Remarks: The difference result of calibrated electrode should be within +/- 2.5%

Place:	Laboratory room	Calibration Date:	July 22, 2021
Service Specialist:		Signature:	Electronic Signature

Hot Air Oven

Model : UM 400

Serial No. : 900982



ASIA MEDICAL AND AGRICULTURAL LABORATORY
AND RESEARCH CENTER CO., LTD.

361,361/1-4 Sol Ladprao 122, (Mahachulalongkornrajavidyalaya University)
Bangkok, Thailand 10310, Head Office
Tel: (66) 2-934-2381-3 Fax: (66) 2-934-0661
http://www.amarc.co.th Email: d@amarc.co.th



NSC-TS15-17025
CALIBRATION 0152

Certificate No. : 21-049716
Sample code : 21-19686-006

Page 1 of 3

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1982 CO., LTD.

683 Moo 11, Sukhapiban 8 Rd., Nongkham,
Sriacha, Chonburi 20230

Location of calibration : EASTERN THAI CONSULTING 1982 CO., LTD.

(Hot Lab)

Equipment : Temperature controlled enclosures (Hot air oven)

Manufacturer : Memmert Model : UM 400

Serial No. : 900882 ID No. : LABE 17/1

Date of receipt : 09 June 2021 Date of calibration : 09 June 2021

Condition of calibration

1 Environment Ambient temperature : Maximum 32.7 °C ; Minimum 30.1 °C

Relative humidity : Maximum 60.3 % ; Minimum 44.1 %

Line voltage supplied : Maximum 228.5 VAC ; Minimum 221.3 VAC

2 Calibration method : TLAS-G-20 : Guidelines for calibration and checks of temperature controlled enclosures

3 Reference standard instrument

Instrument	ID No.	Certificate No.	Due date
Data Acquisition With Sensor (RTD-PT100)	LB-DA-12 (RTD-178 to RTD-186)	21-038924	06 May 2022

4 This certificate is traceable to the International system of unit (SI Unit)

The measurement is traceable to Thailand Institute of Scientific and Technological Research through Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.

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

6 Condition of calibration item : Normal

Calibrated by

Approved by

Date of issue : 14 June 2021

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)

FW-CL-174

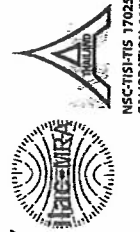
Rev.00

Effective Date: 04/05/21



ASIA MEDICAL AND AGRICULTURAL LABORATORY
AND RESEARCH CENTER CO., LTD.

361,361/1-4 Sol Ladprao 122, (Mahachulalongkornrajavidyalaya University)
Bangkok, Thailand 10310, Head Office
Tel: (66) 2-934-2381-3 Fax: (66) 2-934-0661
http://www.amarc.co.th Email: d@amarc.co.th



NSC-TS15-17025
CALIBRATION 0152

Certificate No. : 21-049716

Sample code : 21-19686-006

Page 2 of 3

REPORT OF CALIBRATION

Results of calibration

Resolution : 0.1 °C

1. Reporting of temperature

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Measured temperature at Each Positions (°C)								Uncertainty ± (°C)	Coverage factor k	
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8			# g ^{ref}
85	85.0	85.0	84.98	84.92	84.81	84.86	84.93	84.88	84.93	84.82	84.92	0.27	2.00

2. Characterization result

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
85	0.16	0.32	0.67

Note

UUC* = Unit Under Calibration

FW-CL-018

Rev.03

Effective Date: 04/05/21



ASIA MEDICAL AND AGRICULTURAL LABORATORY
AND RESEARCH CENTER CO., LTD.

361/361/1-4 Soi Ladprao 122, (Mehadthal 1), Ladprao Road, Phlaphla,
Wangthonglang, Bangkok, Thailand 10310, Head Office
Tel:(66) 2-934-2381-3 Fax:(66) 2-934-0661
<http://www.amarc.co.th> Email: cl@amarc.co.th



NSC-TIS-TIS 17025
CALIBRATION 0152

Certificate No. : 21-049716

Sample code : 21-19686-006

Page 3 of 3

REPORT OF CALIBRATION

Results of calibration

Note

1 Sensor installation locations

1.1 All sensors at any corners or walls should be positioned

5 cm (a x b x c) from the wall.

1.2 The reference sensor is preferably located of the geometric center of the chamber.

2 Interior dimensions approx of chamber ;

W = 40 cm ; D = 28 cm ; H = 39 cm

3 Air valve or fresh air level ; Off

4 Fan level ; Open

5 The quoted uncertainty include " Stability of chamber and loading effect in chamber at 20% of uniformity ".

6 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.

7 Temperature stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

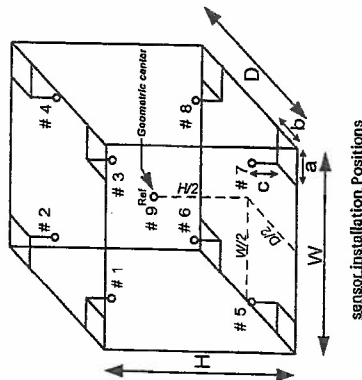
8 Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.

9 UUC* Reading - the average reading of indicating device that forms the integral part of the enclosure.

10 Calibration results without adjustment.

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3000

End of report



INDUCTIBELY COUPLED PLASMA SPECTROMETER

Model : Prodigy 7

Serial No. : P70177

CERTIFICATE OF INSTRUMENT PERFORMANCE

INSTRUMENT:

INDUCTIVELY COUPLED PLASMA SPECTROMETER

Telendyne Leeman Labs

Prodlqv 7

P70177

Eastern Thal Consulting 1992 Co., Ltd

CHECKING:

SPECTROMETER

Wavelength Accuracy check by use emission line of Hg Lamp

Mercury line 253.652 nm.

Plasma View (Dual View)

CMOS Detector check

Align View by Mn line 257.610 nm.

RF GENERATOR

Incident Power 1.200 ±10 Watt
Reading = ...1.2.... Watt

INTRODUCTION

Plasma Torch, Inle

Plasma Torch. Injector. Spray chamber, Nebulizer

Peristaltic pump & Tubing

EXHAUSTING & COOLING SYSTEM

Safely Interlock Switch (Door, Aragon pressure, Water pressure)

Cooling System water flowrate & low pressure switch

Elowrate of Air blower

WEB & SOFTWARE

Blossa Irradiation s

ANALYTICAL TEST

Full Name:

Full Training Curriculum & Certification

00000000000000000000



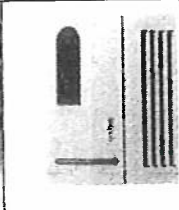

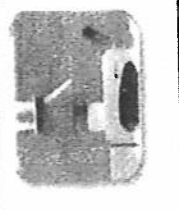
DATE: December 21, 2021

December 21, 2021

TELEDYNE LEMMAN LABS
ENVIRONMENTAL

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7	
Customer: บริษัท สิตภัณฑ์ไทย คอนกรีต 1992 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
S/N: P70177	

1. Gas Supply /Water Re-circulator/Exhaust Hood Check:

<p>Gas system:</p> <p>ตรวจสอบระบบแก๊สและภาชนะบรรจุ</p> <p>Argon Pressure: 85 psi (✓) No leak</p> <p>Nitrogen Pressure: - psi (-) No leak</p> <p>Oxygen Pressure: - psi (-) No leak</p>	
<p>(✓) Change camera purge gas Dehydrator (1 times /years)</p> <p>Next line replacement <u>CH₂CO₂</u></p> <p>เปลี่ยนตัวถักความชื้นที่ไดคอสท์ ทุก 1 ปี</p>	
<p>Water Chiller: RF generator</p> <p>flow rate 4.4 LPM</p> <p>Temperature 2.6 °C ตรวจสอบอุณหภูมิ</p> <p>Leak inspected (✓) No leak ตรวจสอบการรั่วซึม</p>	
<p>Water Chiller : Camera</p> <p>(✓) check water level and refill ตรวจสอบระดับน้ำและเติมน้ำ</p> <p>(✓) change water เปลี่ยนน้ำ</p> <p>Temperature -3.4 °C ตรวจสอบอุณหภูมิ</p>	
<p>Exhaust Hood</p> <p>Flow rate 650 CFM (system request > 150)</p>	

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีสเทิร์นไทย คอนกรีต 1992 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7

2. Computer & Software Check

Description	Status
Interface Cable USB (✓) No broken	OK
Software Version	OK
(✓) Operation function check :	OK
(✓) Open /Save /Edit method	OK
(✓) Instrument Control	OK
(✓) Sequence	OK
(✓) Full Frame Capture (Echelle Mode)	OK
(✓) Auto alignment /Hg alignment	OK
(✓) Calibration Curve	OK
(✓) Re-Calculation	OK
(✓) Print Report	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีสเทิร์นไทย คอนกรีต 1992 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7

3. Instrument Control

Description	Status
Optical view position: ตรวจสอบตำแหน่งฟังก์ชันที่ติดตั้งในเครื่อง	
Hg Lamp Deltas	
X -1 Y -6	OK
XUV 0	OK
Axial peak positions X332S Y120S	OK
Radial peak positions X111 Y113S	OK
Hg lamp peak positions X22AS Y21S	OK
Plasma Control ตรวจสอบการทำงานของระดับพลาสมา	
(✓) Auto Start	OK
(✓) Extinguish	OK
(✓) RF power setting	OK
(✓) Igniter	OK
(✓) Air Knife	OK
Torch Gas ตรวจสอบการทำงานของระบบแก๊สที่ใช้ในพลาสมา	
(✓) Coolant /Plasma Flow control	OK
(✓) Aux Flow	OK
(✓) Nebulizer Flow	OK
(✓) Optimize sample introduction function	OK
(✓) Peristaltic pump control	OK
(✓) Auto sampler Control	OK
(✓) Camera Support Module	OK
(✓) Diagnostic	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อุตสาหกรรม อากาศ จำกัด 1992 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

4. Cleaning & Replacement

Description	Status
✓ O-Ring Torch replacement	OK
✓ Pump Tubing replacement	OK
✓ Glassware cleaning (Torch, Nebulizer, Spray chamber)	OK
✓ Lube the roll peristaltic pump	OK
✓ Optical windows cleaning	OK
✓ Camera Water Re-circulator (water change/ refilled)	OK
✓ RF Generator Water Re-circulator (water change/ refilled)	OK
✓ Cleaning Electronics Board with spray cleaner	OK
✓ Cleaning dust inside Unit	OK
✓ Cleaning dust filter	OK

5. Safety Interlocks

Description	Status
✓ Door switch	OK
✓ RF Water Re-circulator	OK
✓ Camera Water Re-circulator	OK
✓ Camera purge gas	OK
✓ Argon pressure	OK
✓ Nitrogen pressure	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อุตสาหกรรม อากาศ จำกัด 1992 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

6. Hardware Check with SALSADXE Diagnostics

Power Supply	Value	Status
-12 VDC (11 - 14.5 VDC)	-13.97	OK
+12 VDC (11 - 14.5 VDC)	12.87	OK
+3.3 VDC	3.236	OK
+5.0 VDC	4.945	OK
+13.5 VDC	13.465	OK

Plasma Generator	Value	Status
ICP Current 0.500A = 1kW	0.514	OK
ICP Ref 5.0Vdc = 1kW	5.170	OK
ICP Current 0.00 Vdc = 0kW	0	OK
ICP Ref 0.00Vdc = 0kW	0	OK
RF Water (Hz) OFF	0	OK
RF Water (Hz) ON	25	OK
Air Knife Pres. (0.00V) OFF	0	OK
Air Knife Pres. (3.0 - 7.0 V) ON	3.878	OK
Neb 25 @ setting of 25 PSI	25	OK
Cool 18 @ setting of 18 LPM	18	OK
Aux 0.6 @ setting of .6 LPM	0.6	OK
Camera Water pump	0	OK
Pump Current (0.000 A) OFF	0	OK
Pump Voltage (0.000 V) OFF	0	OK
Pump Current (0.8 to 4.0A) ON	1.08	OK
Pump Voltage (8 to 13 V) ON	12.52	OK

Set Points	Value	Status
Air In Set Point 32°C	32	OK
Can Tec Temperature -32°C	-32	OK
Op Purge Low 0.77 LPM	0.77	OK
Op Purge High 15.50 LPM	15.5	OK
Can Wtr T 28°C	28.02	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีซีที เทคโนโลยี จำกัด 1992 จำกัด	Date: December 21, 2021
Instrument: LCP-OES	Model: Prodigy 7
	S/N: P70177

7. Ma Check for performance Test

	Condition for performance Test	Condition Test	Status
Standard	1 ppm, 5 ppm, 10 ppm	10 ppm	OK
Power plasma	1.20 kw	1.2	OK
Plasma gas	16.0 LPM	1.6	OK
Auxiliary Gas	0.8 LPM	0.8	OK
Nebulizer	1.2 LPM	1.2	OK
Pump Speed	25 RPM	25	OK
Integration time	15 s Axial, 5 s Radial	10 s, 5 s	OK
Nebulizer Type	Seaspray, Conical, Meinhard	Conical	OK
Intensity first performance	1 ppm ≥ 4,000,000 5 ppm ≥ 15,000,000 10 ppm ≥ 50,000,000	69,343,926	OK

LIQUID IN GLASS THERMOMETER

Model : Total Immersion

Serial No. : 43560



QUALITY CALIBRATION CO.,LTD.
235 Petchkasem 63/2 Road, Laksong, Bangkok, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584
www.qcalibration.com



CERTIFICATE No : 21T10802
REFERENCE No : 62916-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : LIQUID IN GLASS THERMOMETER
MANUFACTURER : PRECISION
MODEL : 0 °C TO 100 °C

SERIAL No : 43360

ID No : LABE 16/1

RESOLUTION : 0.1 °C

TYPE : TOTAL IMMERSION

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : EASTERN THAI CONSULTING 1992 COMPANY LIMITED
999 MOO.11 NONGKHAM, SRIRACHA, CHONBURI
20230

CALIBRATED BY : [REDACTED]

CALIBRATION DATE : 27-Oct-21

APPROVED BY : [REDACTED]

ISSUED DATE : 27-Oct-21

RECEIVED DATE : 21-Oct-21

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
QUALITY CALIBRATION CO., LTD.

F-G010 REV 02



QUALITY CALIBRATION CO.,LTD.
235 Petchkasem 63/2 Road, Laksong, Bangkok, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584
www.qcalibration.com

CERTIFICATE No : 21T10802

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : LIQUID IN GLASS THERMOMETER
MANUFACTURER : PRECISION
MODEL : 0 °C TO 100 °C
ID No : LABE 16/1
RESOLUTION : 0.1 °C
RECEIVED DATE : 21-Oct-21
AMBIENT TEMPERATURE : 23 °C ± 3 °C
SERIAL NUMBER : 43360
TYPE : TOTAL IMMERSION
CALIBRATION DATE : 27-Oct-21
RELATIVE HUMIDITY : 50 %RH ± 20 %RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BASED ON ASTM E77:1992 BY COMPARISON WITH STANDARD PLATINUM RESISTANCE THERMOMETER (SPRT) INTO LIQUID BATH TEMPERATURE CONTROLLER. THE TEMPERATURE SCALE USED WAS BASED ON ITS-90.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) STANDARD THERMOMETER	1502	77964	21T3033	08-Mar-22
2) SPRT PROBE	5614	636626	21T3033	08-Mar-22
3) PRECISION BATH	7320	A21105	20T12163	16-Dec-21
4) PRECISION BATH	CTR-40	A68155	20T12164	22-Dec-21

3. THIS RESULT WAS FOUND ACCURATE AS SHOWN ON DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-

- NATIONAL INSTITUTE OF METROLOGY (THAILAND).

RESULT OF CALIBRATION : WITHOUT ADJUSTMENT

STANDARD READING (°C)	UUC* READING (°C)	IMMERSION DEPTH (mm)	CORRECTION (°C)	EMERGENT STEM TEMPERATURE (°C)	UNCERTAINTY OF MEASUREMENT (±°C)
0.004	0.0	60	0.004	N/A	0.090
25.009	25.0	160	0.009	N/A	0.090
50.012	50.0	270	0.012	N/A	0.090

UUC* : UNIT UNDER CALIBRATION

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k =2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



F-G010 REV 02

pH Meter

Model : SevenCompactTM pH/Ion Meter S220

Serial No. : B448305208

Certificate Number CCP-0443-21

Calibration Certificate SevenCompact™ pH/Ion Meter S220

Customer

Company EASTERN THAI CONSULTING 1992 CO., LTD.
Address 893 Moo 11, Sukhaphiban 8 Rd.,
Nong Khai, Sriracha
Choburi 20230

Customer ID number 301608441

Customer representative

Order Number



Instrument

Type	SevenCompact™ S220	Instrument Serial Number	B448305208
Internal Identification	LABE 11/4	Firmware version	1.20.08

Technical specifications

Measuring Range	-1999.9 ... 1999.9 mV	-2.000 ... 20.000 pH
Resolution	0.1 mV	0.001 pH
Limit of Error	± 0.2 mV	± 0.002 pH

Temperature range MTC	-30.0 ... 130.0 °C
Temperature range ATC	-5.0 ... 130.0 °C
Resolution	0.1 °C
Limit of Error	± 0.1 °C

Procedure Statement

METTLER TOLEDO Certification SOP (Doc. No. 30027577) will be used as referring documentation to adjust and certify the instrument indicated in the "Type" and "Serial number" section. The measurement results of this certification were obtained at ambient conditions.



Certificate Number CCP-0443-21

Certification Tools

Certified digital voltmeter

Manufacturer GOSSEN METRAWATT
Control No. ANA77

Serial number ZD1740
Certificate number EIU202338
Due date July 14, 2021

Certified Temperature
Resistors

Manufacturer METTLER TOLEDO / ME-5130241
Control No. IN66

Serial number A116
Certificate number 52542
Due date December 3, 2021



Certificate Number CCP-0443-21

Certification Measurements

pH/mV Sensor Input				
Designation	Certified value	Measured value	Max. Tolerance	Passed / Failed
-1800 mV	-1800.0 mV	-1899.9 mV	0.2 mV	Passed
-1000 mV	-1000.0 mV	-999.9 mV	0.2 mV	Passed
-500 mV	-500.0 mV	-500.0 mV	0.2 mV	Passed
-180 mV	-180.0 mV	-180.0 mV	0.2 mV	Passed
0 mV	0.0 mV	0.0 mV	0.2 mV	Passed
180 mV	180.0 mV	180.0 mV	0.2 mV	Passed
500 mV	500.0 mV	500.0 mV	0.2 mV	Passed
1000 mV	1000.0 mV	999.9 mV	0.2 mV	Passed
1800 mV	1800.0 mV	1899.9 mV	0.2 mV	Passed

pH/mV Sensor Input at high Impedance				
Designation	Measured low Imp.	Measured high Imp.	Max. Tolerance	Passed / Failed
1800 mV	1899.9 mV	1899.9 mV	0.6 mV	Passed

Temperature Sensor Input				
Designation	Nominal value	Measured value	Max. Tolerance	Passed / Failed
NTC 30 kΩ, 0 °C	0.0 °C	0.0 °C	0.1 °C	Passed
NTC 30 kΩ, 25 °C	25.0 °C	25.0 °C	0.1 °C	Passed
NTC 30 kΩ, 50 °C	50.0 °C	49.9 °C	0.1 °C	Passed
NTC 30 kΩ, 75 °C	75.0 °C	75.0 °C	0.1 °C	Passed
NTC 30 kΩ, 100 °C	100.0 °C	100.0 °C	0.1 °C	Passed
PT1000, 0 °C	0.0 °C	0.0 °C	0.1 °C	Passed
PT1000, 25 °C	25.0 °C	25.0 °C	0.1 °C	Passed
PT1000, 50 °C	50.0 °C	50.0 °C	0.1 °C	Passed
PT1000, 75 °C	75.0 °C	75.0 °C	0.1 °C	Passed
PT1000, 100 °C	100.0 °C	100.0 °C	0.1 °C	Passed

Summary of Certification

Certification of instrument

Passed

The instrument referred to in this certificate has fulfilled the criteria of the certification. This is indicated by the notation Passed in the column above.

Remarks

Calibration Date: April 21, 2021

Signature ELECTRONIC SIGNATURE

Mettler-Toledo (Thailand) Limited

METTLER TOLEDO

Performance Test

Control No. CCE-0443-21/1

Company:

EASTERN THAI CONSULTING 1992 CO., LTD.

Address:

683 Moo 11, Sukhaphiban 8 Rd., Nong Kham, Sriracha

Chonburi 20230

Order Number: "0332112835"

pH Electrode

Type:

InLab Expert Pro-ISM

SN:

0373618

Certified standards used

Standard 1: Type: pH Buffer			
Nominal value: pH (25.00 °C):		4.01	Exp. date: Aug-22
Lot No.:		1F217A	
Standard 2: Type: pH Buffer			
Nominal value: pH (25.00 °C):		7.00	Exp. date: Jul-22
Lot No.:		1F180D	
Standard 3: Type: pH Buffer			
Nominal value: pH (25.00 °C):		9.21	Exp. date: Nov-21
Lot No.:		1E312C	

Test equipment:

pH Meter

Manufacturer: METTLER TOLEDO

Cal date: 21-Apr-21

S/N:

B448305208

No. of certificate: CCP-0443-21

Model: S220

Adjustment

Sel Calibration Buffer			
B2: (25 °C) 7.00, 4.01, 9.21			
Select Calibration Mode			
3-Point Calibration			
Cal 1			
°C	pH	°C	pH
ATC	25.8	7.00	ATC
ATC	26.0	4.01	ATC
Offset (mV)	2.4		
Slope % (or mV/pH)	97.7		
Cal 3	ATC		
Slope % (or mV/pH)	97.7		

Measurements

Before adjustment			
Buffer Values	Measured	Difference	After adjustment
Buffer Values			
pH	°C	pH	°C
4.01	26.0	ATC	4.02
7.00	25.8	ATC	7.01
9.20	25.7	ATC	9.21
Difference			
pH	°C	pH	°C
4.01	25.8	ATC	4.01
7.00	25.5	ATC	7.00
9.20	25.6	ATC	9.20

Remarks: The difference result of calibrated electrode should be within ± 0.05 pH.

Place:

Laboratory

Calibration Date:

April 21, 2021

Service Specialist:

Signature:

Electronic Signature

STANDARD WEIGHT 50 g

Certificate No. : 19-045373
Sample code : 19-15155-001

Page 1 of 3

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapiban 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of calibration : Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.
(Calibration Laboratory)

Equipment : STANDARD WEIGHT 50 g

Manufacturer : METTLER TOLEDO

Class : F1

Serial No. : N/A

ID No. : LABE 10/1

Date of Receipt : 30 May 2019

Date of Calibration : 03 June 2019

Calibrated by [REDACTED] Approved by [REDACTED]

Date of Issue : 06 June 2019

The uncertainties are for a confidence probability of approximately 95%

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)

Certificate No. : 19-045373
Sample code : 19-15155-001

Page 2 of 3

REPORT OF CALIBRATION

Equipment : STANDARD WEIGHT 50 g

Manufacturer : METTLER TOLEDO

Class : F1

Serial No. : N/A

ID No. : LABE 10/1

Result of Calibration :

Conventional value of the result of weighing in air. For a weight taken at a reference temperature (t_{ref}) of 20 °C, the conventional mass is the mass of a reference weight of a density (ρ_{ref}) of 8000 kg.m⁻³ which it balances in air of a reference density (ρ_a) of 1.2 kg.m⁻³

Description	Deviation (mg)	Conventional Mass	Expanded Uncertainty (mg)	Maximum Permissible Error, OIML Class F1 \pm (mg)	ID No.
50 g	-0.317	49.999683 g	0.10	0.30	LABE 10/1

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3000 [REDACTED]



Certificate No. : 19-045373

Sample code : 19-15155-001

Page 3 of 3

REPORT OF CALIBRATION

Condition of Calibration

1. Ambient Conditions : Temperature $20^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$, Relative humidity $50\% \pm 10\%$ and air density 1.19 kg/m^3
2. Calibration Method : Direct comparison weighing according to OIML R111-1 : 2004(E)
3. Description of Calibrated Item :

Type and Nominal Value : Standard Weight 50 g

Shape : Cylindrical weight with knob

Case : Wood Box

4. Reference Standard Instrument

Instrument	Class	ID. No.	Certificate No.	Due date
1) STANDARD WEIGHT 1 mg to 1 kg	E2	LB-WE-57	B634921863	11 August 2019

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

- Through the reference standard laboratory of Mettler-Toledo GmbH, 8606 Greifensee, Switzerland (Instrument number 1).

6. Condition of Calibration item : Normal

End of Report

STANDARD WEIGHT 100 g



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NSC-TIS/ITS 17025
CALIBRATION 0152

Certificate No. : 19-045374
Sample code : 19-15155-002

Page 1 of 3

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapiban 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of calibration : Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.
(Calibration Laboratory)

Equipment : STANDARD WEIGHT 100 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/2

Date of Receipt : 30 May 2019

Date of Calibration : 03 June 2019

Calibrated by [Redacted] Approved by [Redacted]

Date of Issue : 06 June 2019

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)

REPORT OF CALIBRATION

Equipment : STANDARD WEIGHT 100 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/2

Result of Calibration :

Conventional value of the result of weighing in air. For a weight taken at a reference temperature (t_{ref}) of 20 °C, the conventional mass is the mass of a reference weight of a density (ρ_{ref}) of 8000 kg.m⁻³ which it balances in air of a reference density (ρ_o) of 1.2 kg.m⁻³

Description	Deviation (mg)	Conventional Mass	Expanded Uncertainty (mg)	ID No.
100 g	-0.24	99.99976 g	0.16	LABE 10/2

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M

Certificate No. : 19-045374

Sample code : 19-15155-002

Page 3 of 3

REPORT OF CALIBRATION

Condition of Calibration

1. Ambient Conditions : Temperature $20^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$, Relative humidity $50\% \pm 10\%$ and air density 1.19 kg/m^3
2. Calibration Method : WI-CL-007 base on OIML R 111-1 : 2004(E)

3. Description of Calibrated Item :

Type and Nominal Value : Standard Weight 100 g

Shape : Cylindrical weight with knob

Case : Wood Box

4. Reference standard instrument

Instrument	Class	ID. No.	Certificate No.	Due date
1) STANDARD WEIGHT 1 mg to 1 kg	E2	LB-WE-57	B634921863	11 August 2019

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

- Through the reference standard laboratory of Mettler-Toledo GmbH, 8606 Greifensee, Switzerland (Instrument number 1).

6. Condition of Calibration item : Norm

End of Report

STANDARD WEIGHT 50 g



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Email: c@amarc.co.th

MSC-151515 17025
CALIBRATION 0152

Page 1 of 3

Supersede to Calibration Certificate No. 19-053921

Certificate No. : 19-053921/1

Sample code : 19-17930-002

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapiban 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of calibration : Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.
(Calibration Laboratory)

Equipment : STANDARD WEIGHT 50 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/4

Date of Receipt : 25 June 2019

Date of Calibration : 06 July 2019

Calibrated by [Redacted] Approved by [Redacted]

Date of Issue : 16 September 2019

The calibration result is applied only to the above calibrated item and was found accurate as shown on the certificate.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)



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MSC-151515 17025
CALIBRATION 0152

Page 2 of 3

Supersede to Calibration Certificate No. 19-053921

Certificate No. : 19-053921/1

Sample code : 19-17930-002

REPORT OF CALIBRATION

Equipment : STANDARD WEIGHT 50 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/4

Result of Calibration : Without adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature (t_{ref}) of 20°C, the conventional mass is the mass of a reference weight of a density (ρ_{ref}) of 8000 kg.m⁻³ which it balances in air of a reference density (ρ_a) of 1.2 kg.m⁻³

Description	Deviation (mg)	Expanded Uncertainty (mg)		ID No.
		Conventional Mass	Expanded Uncertainty	
50 g	-0.060	#REF!	0.10	LABE 10/4

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3



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NSC718-TIS 17025
CALIBRATION 0152

Supersede to Calibration Certificate No. 19-053921

Certificate No. : 19-053921/1

Sample code : 19-17930-002

Page 3 of 3

REPORT OF CALIBRATION

Condition of Calibration

1. Ambient Conditions : Temperature $20^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$, Relative humidity $50\% \pm 10\%$ and air density 1.19 kg/m^3
2. Calibration Method : WI-CL-007 base on OIML R 111-1 : 2004(E)

3. Description of Calibrated Item :

Type and Nominal Value : Standard Weight 50 g

Shape : Cylindrical weight with knob

Case : Wood Box

4. Reference standard instrument

Instrument	Class	ID. No.	Certificate No.	Due date
1) STANDARD WEIGHT 1 mg to 1 kg	E2	LB-WE-57	B634921863	11 August 2019

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

- Through the reference standard laboratory of Mettler-Toledo GmbH, 8606 Greifensee, Switzerland (Instrument number 1).

6. Condition of Calibration Item : Normal

End of Report

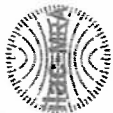
THERMO-HYGROMETER

Model : 608-H1

Serial No. : 45106737



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http://www.amarc.co.th Email: d@amarc.co.th

NSC-TIS-17025
CALIBRATION 0152

Certificate No. : 21-062722

Sample code : 21-24788-002

Page 1 of 2

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD

683 Moo 11, Sukhapiban 8 Rd, Nongkham,

Sriracha, Chonburi 20230

Location of calibration : Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.

(Calibration laboratory)

Equipment : Digital thermo-hygrometer

Manufacturer : Testo

Model : 608-H1

Serial No. : 45106737

ID No. : LABE 09/7

Date of receipt : 23 July 2021

Date of calibration : 29 July 2021

Condition of calibration

1 Environment Ambient temperature : 23.0 °C ± 3.0 °C

Relative humidity : 55.0 % ± 15.0 %

2 Calibration method

2.1 In-house method : WI-CL-045 By comparison with thermometer standard / chilled mirror hygrometer in controlled chamber.

2.2 The calibration by comparison unit under calibration (UUC) to the thermometer standard / chilled mirror hygrometer in controlled chamber in a chamber at the controlled temperature/ relative humidity.

3 Reference standard instrument

Instrument	Model	Code No.	Certificate No.	Due date
3.1 Chilled Mirror	Optidew Vision	LB-DP-02 & LB-DP-02 (DP)	TH-0018-21	10 March 2022
3.2 Digital Thermometer	Optidew Vision	LB-DP-02 & LB-DP-02 (Temp.)	21-032217	06 April 2022
3.3 Digital Thermometer	34972A	LB-DA-07 with RTD-89	20-085967	17 September 2021

4 This certificate is traceable to the international system of unit (SI Unit)

4.1 Instrument No.3.1 through : National Institute of Metrology (Thailand)

4.2 Instrument No.3.2 and 3.3 through : Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.

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

6 Condition of calibration item : Normal

Calibrated by

Approved by

Date of issue : 11 August 2021

The calibration result is applied only to the above calibrated item and was found accurate as shown

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)

FM-CL-114

Rev.00

Effective Date: 04/05/21



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NSC-TIS-17025
CALIBRATION 0152

Certificate No. : 21-062722

Sample code : 21-24788-002

Page 2 of 2

REPORT OF CALIBRATION

Results of calibration

- Temperature measurement

Resolution of unit under calibration : 0.1 °C

Range : 0 °C to 50 °C

Calibration point °C	Average of standard reading		Unit under calibration		Expanded uncertainty °C
	Controlled humidity %RH	Temperature °C	Average reading °C	Correction value °C	
20	50	20.02	20.1	- 0.08	± 0.40
25	50	25.02	25.0	+ 0.02	± 0.40
30	50	30.00	28.7	+ 0.30	± 0.40

- Humidity measurement

Resolution of unit under calibration : 0.1 %RH

Range : 10 %RH to 95 %RH

Calibration point %RH	Average of standard reading		Unit under calibration		Expanded uncertainty %RH
	Air temperature °C	Calculated humidity %RH	Average reading %RH	Correction value %RH	
45	25.00	45.13	52.4	- 7.27	± 1.3
60	25.00	60.03	67.5	- 7.47	± 1.5
75	25.00	75.20	82.5	- 7.30	± 1.7

Note

- Calibration results without adjustment

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2.00, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M30

End of report



FM-CL-018

Rev.08

Effective Date: 04/05/21

ANALYTICAL BALANCE (DU)

Model : XS205 DU

Serial No. : 1126323724

Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5 Lualaba Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10260
+66 2723 0362
MT-TH.ServiceSupport@mt.com



MSD-TS-115 1/025
CALIBRATION 0062

Accuracy Calibration Certificate

Customer

Company: EASTERN THAI CONSULTING 1992 CO., LTD.
Address: 683 Moo 11, Sukhaphiban 8 Rd., Nong Kham
City: Sriracha
Contact: [REDACTED]
Zip / Postal: 20230
State / Province: Chonburi
Order Number: 80332196644

Weighing Device

Manufacturer: Mettler Toledo
Model: X5205DU
Serial No.: 1126323724
Building: Laboratory
Floor: 1
Room: Laboratory
Instrument Type: Weighing Instrument
Asset Number: LABE 05/1
Terminal Model: SAT
Terminal Serial No.: 1126323724
Terminal Asset No.: N/A

Range	Max. Capacity	Readability (g)
1	81 g	0.00001 g
2	220 g	0.0001 g

Procedure

Calibration Guideline: EURAMET cg-18 v. 4.0 (11/2015)
CFI/0002/20
METTLER TOLEDO Work Instruction:
This calibration certificate contains measurements for As Found calibration. No As Left calibration was performed because the device was not modified after As Found calibration. Therefore, results for As Left correspond to As Found.
The sensitivity/span of the weighing instrument was adjusted before calibration with a built-in weight.
In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

As Found	Temperature		Humidity	
	Start: 26.9 °C	End: 26.8 °C	Start: 73.8 %	End: 71.9 %

As Found Calibration Date: 22-Jul-2021
As Left Calibration Date: N/A
Issue Date: 23-Jul-2021
Approved Signatory: [REDACTED]

Measurement Results

Repeatability

Test Load: 70 g

	As Found	As Left
1	89.99998 g	N/A
2	89.99997 g	N/A
3	89.99997 g	N/A
4	89.99998 g	N/A
5	89.99997 g	N/A
6	89.99998 g	N/A
7	89.99999 g	N/A
8	89.99998 g	N/A
9	89.99997 g	N/A
10	89.99999 g	N/A
Standard Deviation	0.000008 g	N/A

1 (Test Point)
2d
4d
3d
2d
1d
9
10
6
5
4
3

The "d" in the graph represents the readability of the range interval in which the test was performed.
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	99.99999 g	N/A
2	99.99998 g	N/A
3	99.99998 g	N/A
4	100.00000 g	N/A
5	100.00000 g	N/A
Maximum Deviation	0.00001 g	N/A

1
-1d
1d
-1d
1d

The "d" in the graph represents the readability of the range interval in which the test was performed.

Error of Indication

As Found	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.00000 g	0.00000 g	0.00000 g	0.017 mg	2
2	0.01000 g	0.01000 g	0.00000 g	0.019 mg	2
3	0.10000 g	0.09999 g	-0.00001 g	0.023 mg	2
4	1.00000 g	1.00000 g	0.00000 g	0.032 mg	2
5	4.99998 g	5.00000 g	0.00002 g	0.048 mg	2
6	9.99999 g	10.00001 g	0.00002 g	0.061 mg	2
7	20.00001 g	20.00005 g	0.00004 g	0.082 mg	2
8*	49.99993 g	49.99997 g	0.00004 g	0.12 mg	2
9	99.9999 g	99.9999 g	0.0000 g	0.21 mg	2
10	149.9998 g	149.9998 g	0.0000 g	0.32 mg	2
11	199.9995 g	199.9998 g	0.0003 g	0.37 mg	2

*The calculated uncertainty was replaced by the CMC (Calibration and Measurement Capabilities) value because the calculated uncertainty was smaller than the CMC value.



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor k – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML E2

Weight Set No.:	W528	Date of Issue:	17-Nov-2020
Certificate Number:	170241	Calibration Due Date:	15-May-2022

Thermo Hygrometer

Equipment No.:	IN51	Date of Issue:	02-Mar-2021
Certificate Number:	21H403	Calibration Due Date:	23-Feb-2022

Remarks

FACT adjustment functionality activated

Equipment condition: Good

Next calibration according to customer's procedure

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with $k=2$ in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: $1.5 \cdot 10^{-4} / K$

Temperature range on site for the evaluation of the measurement uncertainty in use: 5 K

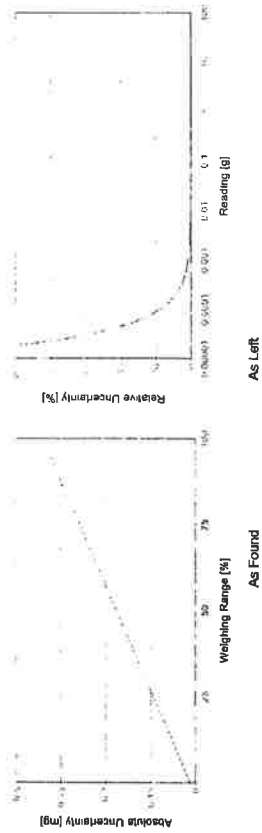
Linearization of Uncertainty Equation

Range		As Found		As Left	
d	Max				
1	0.00001 g	81 g	$U_1 = 0.018 \text{ mg} + 0.00608 \text{ mg/g} \cdot R$	N/A	
2	0.0001 g	220 g	$U_2 = 0.06 \text{ mg} + 0.00603 \text{ mg/g} \cdot R$	N/A	

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Net Indication		As Found		As Left	
0.00220 g		0.018 mg	0.82%	N/A	
0.02200 g		0.018 mg	0.082%	N/A	
0.22000 g		0.019 mg	0.0088%	N/A	
2.20000 g		0.031 mg	0.0014%	N/A	
220.0000 g		1.4 mg	0.00063%	N/A	



The weighing range shown in the absolute uncertainty graph refers to the first interval/range of the device.



GWP® Certificate

As
Found

As
Left



The weighing device meets the given process requirements.

The weighing device meets the given process requirements.

Tests Performed:

☒ As Found

☐ As Left

☒ No adjustments/modifications made. As Left results correspond to As Found.

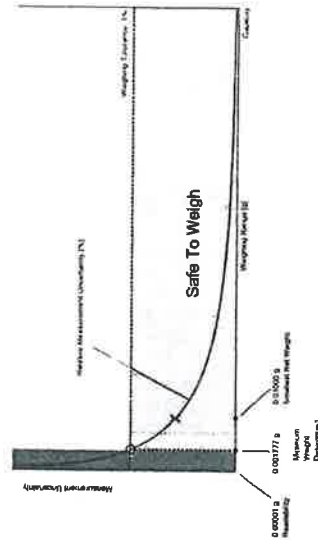
Process Requirements

Weighing Tolerance: 1%

Smallest Net Weight: 0.01 000 g

Safety Factor: 2

Safe Weighing Range



While the values in this graph reflect the actual calibration results, the measurement uncertainty curves are simply a visual representation. This graph reflects As Left testing, unless only As Found was performed.

Minimum Weight

As Found Minimum Weight Table

Range 1					
Minimum weights for different weighing tolerances and safety factors					
Safety Factor					
Tolerance	1	2	3	5	10
0.1%	0.017873 g	0.035965 g	0.054282 g	0.091605 g	0.189140 g
0.2%	0.008909 g	0.017873 g	0.026891 g	0.045095 g	0.091605 g
0.5%	0.003557 g	0.007123 g	0.010697 g	0.017873 g	0.035965 g
1%	0.001777 g	0.003557 g	0.005339 g	0.008909 g	0.017873 g
2%	0.000888 g	0.001777 g	0.002667 g	0.004448 g	0.008909 g
5%	0.000355 g	0.000711 g	0.001066 g	0.001777 g	0.003557 g

The minimum weight table applies to the fine range of the weighing device.

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

As Left Minimum Weight Table

Range 1					
Minimum weights for different weighing tolerances and safety factors					
Safety Factor					
Tolerance	1	2	3	5	10
0.1%	0.017873 g	0.035965 g	0.054282 g	0.091605 g	0.189140 g
0.2%	0.008909 g	0.017873 g	0.026891 g	0.045095 g	0.091605 g
0.5%	0.003557 g	0.007123 g	0.010697 g	0.017873 g	0.035965 g
1%	0.001777 g	0.003557 g	0.005339 g	0.008909 g	0.017873 g
2%	0.000888 g	0.001777 g	0.002667 g	0.004448 g	0.008909 g
5%	0.000355 g	0.000711 g	0.001066 g	0.001777 g	0.003557 g

The minimum weight table applies to the fine range of the weighing device.

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1/1 (no safety factor), 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with $k = 2$ and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

Measurement Results

Results Summary

Repeatability			
As Found	As Left	As Found	As Left
✓	✓	✓	✓

- ✓ = Passed
- ✗ = Failed
- Δ = Safety Factor not met

Repeatability

Test Load: 70 g

Tolerance			
Control Limit	As Found	As Left	Result
0.1%	0.000005 g	0.000005 g	✗
0.2%	0.000010 g	0.000010 g	✓
0.5%	0.000025 g	0.000025 g	✓
1%	0.000050 g	0.000050 g	✓
2%	0.000100 g	0.000100 g	✓
5%	0.000250 g	0.000250 g	✓

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

Eccentricity

Test Load: 100 g

Tolerance			
Control Limit	As Found	As Left	Result
0.1%	0.0500 g	0.0500 g	✓
0.2%	0.1000 g	0.1000 g	✓
0.5%	0.2500 g	0.2500 g	✓
1%	0.5000 g	0.5000 g	✓
2%	1.0000 g	1.0000 g	✓
5%	2.5000 g	2.5000 g	✓

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

Error of Indication

As Found

Reference Value	Error	Control limits for various weighing tolerances							Result
		0.1%	0.2%	0.5%	1%	N/A	N/A	5%	
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A	N/A	✓
20.00001 g	0.00004 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g	1.25000 g	✓
49.99993 g	0.00004 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g	2.50000 g	✓
99.99999 g	0.00000 g	0.05000 g	0.10000 g	0.25000 g	0.50000 g	1.00000 g	1.50000 g	3.75000 g	✓
149.99998 g	0.00000 g	0.07500 g	0.15000 g	0.37500 g	0.75000 g	1.50000 g	2.00000 g	5.00000 g	✓
199.99998 g	0.00000 g	0.10000 g	0.20000 g	0.50000 g	1.00000 g	2.00000 g	2.00000 g	5.00000 g	✓

As Left

Reference Value	Error	Control limits for various weighing tolerances							Result
		0.1%	0.2%	0.5%	1%	N/A	N/A	5%	
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A	N/A	✓
20.00001 g	0.00004 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g	1.25000 g	✓
49.99993 g	0.00004 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.00000 g	2.50000 g	✓
99.99999 g	0.00000 g	0.05000 g	0.10000 g	0.25000 g	0.50000 g	1.00000 g	1.50000 g	3.75000 g	✓
149.99998 g	0.00000 g	0.07500 g	0.15000 g	0.37500 g	0.75000 g	1.50000 g	2.00000 g	5.00000 g	✓
199.99998 g	0.00000 g	0.10000 g	0.20000 g	0.50000 g	1.00000 g	2.00000 g	2.00000 g	5.00000 g	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.

Service Date:
Document Number:
EASTERN TAN CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhaphiban 8 Rd., Nong Kham, Sriracha, Chonburi 20230
Sasiporn Naksin

2021-07-22

TH2046-542-072221-LABBalanceHR

METTLER TOLEDO

Balance Health Report

Device Details

System Details	
Manufacturer:	Mettler Toledo
Model:	XS205DU
Serial number:	1126323724
Firmware:	4.00 / 5.61
Weight set for routine testing:	Yes /

History

Device History		Service History	
Instrument in use:	Yes	Last preventive maintenance:	< 1 year
Instrument age:	> 10 years	Last instrument calibration:	< 1 year
Spare parts available:	Yes	Last minimum weight determination:	Never
Regulations:	ISO		
Process tolerance in %:	1%	Routine testing performed:	Yes
Smallest sample net weight:	0.01000 g		

Check List

Environmental Conditions		General & Functional Checks	
Room temperature fluctuation	✓	Levelling	✓
Exposure to direct sun	✓	Cleanliness	✓
Vibrations	✓	Completeness - missing parts see additional remarks	✓
Draft	✓	Settings optimized for operating environment	✓
Dirt or dust	✓	Other - objections noted as additional remarks	—
Static	✓	Electrical Component Checks	
Mechanical Component Checks		Power supply	✓
Draft shield	✓	Sliding door drive	—
Weighing pan position	✓	Internal weight drive	✓
Housing	✓	Display	✓
Other - objections noted as additional remarks	—	Other - objections noted as additional remarks	—

Recommendations

Mechanical Repair Quality		Process Efficiency	
Instrument calibration		Uninstall instrument	
Identify safe weighing range		Replace instrument	
GWP verification / risk assessment	Yes	Replace / add pins (see additional remarks)	
Preventive maintenance		Onsite repair	
Perform routine testing with test weights		Detect repair	
User training		Use of accessories (see additional remarks)	
Contact	Name: Sasiporn Naksin	Position:	Phone: 0960513303
			Email: oc_lab@ac1992.com

Additional Remarks & Recommendations

Engineer Details	

This is not a certificate.

It should not be used to interpret final results for the testing of these devices.

Legend: ✓ Good/Pass ⚠ Needs Attention ✗ Bad/Fail — Not Applicable

METTLER TOLEDO Service

Report Version: 1.13, Software Version: 4.28.0.3, Page: 3/1, © METTLER TOLEDO

BAROMETER

Equipment : Analog Barometer

ID No. / Tag No. : BM001/41



MIRACLE INTERNATIONAL TECHNOLOGY CO., LTD
214 Bangwak Rd. Bangpai Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>

CALIBRATION CERTIFICATE

Certificate No. : AD2106-032-0001

Date Issued : 04-Jun-21

Customer : Eastern Thai Consulting 1992 Co., Ltd.
683 Moo 11 Sukhapibarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

Equipment : Analog Barometer

Manufacturer : Barigo
Model : -
Serial No. : -
ID No./Tag No. : BM001/41
Date Received : 02-Jun-21
Date Calibrated : 04-Jun-21

Calibrated by : [REDACTED]

Calibration Method or Calibration Procedure Used

In-house method : CP-21 base on DKD-R 6-1: Edition 3 2014.

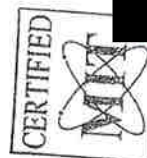
This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Technical Manager, Miracle International Technology Company Limited.

Approved by :



Page 1 of 2

Certificate No : AD2106-032-0001

Environment : Ambient Temperature : (25 ± 2)°C
Relative Humidity : (50 ± 15)%RH

STD Reading hPa	UUC Reading (hPa) Before Adjusted	UUC Reading (hPa) After Adjusted	UUC Error hPa	Uncertainty ± hPa
990.00	990.0	-	0.00	0.91
1000.00	1000.0	-	0.00	0.91
1010.00	1010.0	-	0.00	0.91
1020.00	1020.0	-	0.00	0.91
1030.00	1030.0	-	0.00	0.91

STD = Standard

UUC = Unit Under Calibration

Calibrated condition :

Pressure Medium : Air : Density = 1.19 kg/m³ @ 20°C, 1 bar
Mounting Position : Vertical
Reference Level : at center of its dial

Description of UUC :

Range : 955 - 1075 hPa Absolute
Calibration Range : 990 - 1030 hPa Absolute
Scale Interval : 1 hPa
Resolution : 0.5 hPa Absolute

Measurement Standards Used & Traceability :

The International System of Units (SI) through

IRPC Certificate No. CL1-P210029 for Digital Barometer Serial No. 290185, Due 19-Oct-21

End of Certificate

Page 2 of 2

Hot Air Oven

Model : UM 400

Serial No. : 900982



ASIA MEDICAL AND AGRICULTURAL LABORATORY
AND RESEARCH CENTER CO., LTD.

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Wanghonglang, Bangkok, Thailand 10310, Head Office
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http://www.amarc.co.th Email: d@amarc.co.th



MSC-TS1615 17025
CALIBRATION 0152

Certificate No. : 21-049716
Sample code : 21-19686-006

Page 1 of 3

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.

683 Moo 11, Sukhapiban 8 Rd., Nongkham,
Sriache, Chonburi 20230

Location of calibration : EASTERN THAI CONSULTING 1992 CO., LTD.

(Hot Lab)

Equipment : Temperature controlled enclosures (Hot air oven)

Manufacturer : Memmert Model : UM 400

Serial No. : 900982 ID No. : LABE 17/1

Date of receipt : 09 June 2021 Date of calibration : 09 June 2021

Condition of calibration

1 Environment Ambient temperature : Maximum 32.7 °C ; Minimum 30.1 °C
Relative humidity : Maximum 60.3 % ; Minimum 44.1 %
Line voltage supplied : Maximum 228.5 VAC ; Minimum 221.3 VAC

2 Calibration method TLAS-G-20 : Guidelines for calibration and checks of temperature controlled enclosures

3 Reference standard instrument

Instrument	ID.No.	Certificate No.	Due date
Data Acquisition With Sensor (RTD-P100)	LB-DA-12 (RTD-178 to RTD-186)	21-038924	08 May 2022

4 This certificate is traceable to the international system of unit (SI Unit)

The measurement is traceable to Thailand Institute of Scientific and Technological Research through Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.

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

6 Condition of calibration item : Normal

Calibrated by

Approved by

Date of issue : 14 June 2021

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)



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AND RESEARCH CENTER CO., LTD.

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MSC-TS1615 17025
CALIBRATION 0152

Certificate No. : 21-049716
Sample code : 21-19686-006

Page 2 of 3

REPORT OF CALIBRATION

Results of calibration

Resolution : 0.1 °C

1. Reporting of temperature

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Measured temperature at Each Positions (°C)								Uncertainty ± (°C)	Coverage factor k	
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8			# 9 ^{Ref}
85	85.0	85.0	84.98	84.92	84.61	84.66	84.93	84.88	84.93	84.82	84.92	0.27	2.00

2. Characterization result

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
85	0.16	0.32	0.67

Note

UUC* = Unit Under Calibration



ASIA MEDICAL AND AGRICULTURAL LABORATORY
AND RESEARCH CENTER CO., LTD.

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Page 3 of 3

Certificate No. : 21-049716

Sample code : 21-19686-006

REPORT OF CALIBRATION

Results of calibration

Note

1 Sensor installation locations

1.1 All sensors at any corners or wells should be positioned

5 cm (a x b x c) from the wall.

1.2 The reference sensor is preferably located of the geometric

center of the chamber.

2 Interior dimensions approx of chamber ;

W = 40 cm ; D = 28 cm ; H = 39 cm

3 Air valve or fresh air level : Off

4 Fan level : Open

5 The quoted uncertainty include " Stability of chamber and loading effect in chamber at 20% of uniformity ".

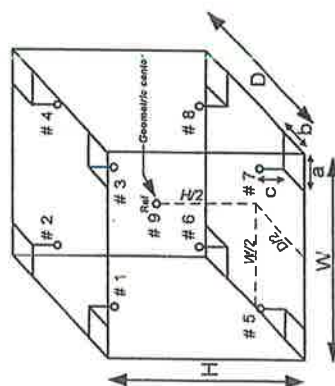
6 Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

7 Temperature stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

8 Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.

9 UUC* Reading - the average reading of indicating device that forms the integral part of the enclosure.

10 Calibration results without adjustment.



sensor installation Positions

The result expanded uncertainty of measurement U is stated as the standard uncertainty multiplied by the coverage factor k, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

End of report

INDUCTIBELY COUPLED PLASMA SPECTROMETER

Model : Prodigy 7

Serial No. : P70177



บริษัท แอปพลิเคชัน ดีไซน์ จำกัด
Application Define Company Limited
84 ซอย บางเขนพัฒนา 9 แขวง บางพลี เขต คลองสามวา กรุงเทพมหานคร 10170
84 Soi Bangchuekphang 9 Bangprom Talangchan, Bangkok 10170
Tel: (66) 2854 7137 E-mail: support@apdefine.co.th Website : http://www.apdefine.co.th
เลขประจำตัวผู้เสียภาษี 010556032481

CERTIFICATE OF INSTRUMENT PERFORMANCE

INSTRUMENT:	INDUCTIVELY COUPLED PLASMA SPECTROMETER
BRAND:	Telendyne Leeman Labs
MODEL:	Prodigy 7
SERIAL NO.	P70177
CUSTOMER:	Eastern Thai Consulting 1992 Co., Ltd
CHECKING:	<p>SPECTROMETER Wavelength Accuracy check by use emission line of Hg Lamp Mercury line 253.652 nm. Plasma View (Dual View) CMOS Detector check Align View by Mn line 257.610 nm.</p> <p>RF GENERATOR Incident Power 1,200 ±10 Watt Reading = ...1.2... Watt</p> <p>SAMPLE INTRODUCTION Plasma Torch, Injector, Spray chamber, Nebulizer Peristaltic pump & Tubing</p> <p>EXHAUSTING & COOLING SYSTEM Safety Interlock Switch (Door, Argon pressure, Water pressure) Cooling System, water flowrate & low pressure switch Flowrate of Air blower</p> <p>COMPUTER & SOFTWARE Plasma Ignition software & Analytical Software</p> <p>ANALYTICAL TEST Full Frame Capture & Echelogram check Calibration Curve & QC Test</p>
STATUS	<p>OK</p> <p>OK</p> <p>OK</p> <p>OK</p> <p>OK</p> <p>OK</p> <p>OK</p> <p>OK</p> <p>OK</p> <p>OK</p> <p>OK</p> <p>OK</p> <p>OK</p>

DATE :

December 21, 2021



PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีสเทิร์นไทย คอนซัลติ้ง 1992 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

1. Gas Supply /Water Re-circulator/Exhaust Hood Check:

<p>Gas system: ตรวจสอบระบบแก๊สและทวี่รั่วซึม Argon Pressure: 85 psi Leak inspected (✓) No leak Nitrogen Pressure: - psi Leak inspected (-) No leak Oxygen Pressure: - psi Leak inspected (-) No leak</p>	
<p>(✓) Change camera purge gas Dehydrator (1 times /years) Next time replacement Check เปลี่ยนตัวถังงานขึ้นให้ทดสอบ ทุก 1 ปี</p>	
<p>Water Chiller: RF generator flow rate 414 LPM Temperature 2.6 C ตรวจสอบอุณหภูมิ Leak inspected (✓) No leak ตรวจสอบทวี่รั่วซึม</p>	
<p>Water Chiller : Camera (✓) check water level and refill ตรวจสอบระดับน้ำและเติมน้ำ (✓) change water เปลี่ยนถ่ายน้ำ Temperature -3.9 °C ตรวจสอบอุณหภูมิ</p>	
<p>Exhaust Hood Flow rate 650 CFM (system request > 150)</p>	

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อลิอันไทย คอนสตรัคชั่น จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

2. Computer & Software Check

Description	Status
Interface Cable USB (✓) No broken	OK
Software Version	OK
(✓) Operation function check:	OK
(✓) Open /Save /Edit method	OK
(✓) Instrument Control	OK
(✓) Sequence	OK
(✓) Full Frame Capture (Echelle Mode)	OK
(✓) Auto alignment /Hg alignment	OK
(✓) Calibration Curve	OK
(✓) Re-Calculation	OK
(✓) Print Report	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อลิอันไทย คอนสตรัคชั่น จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

3. Instrument Control

Description	Status
Optical view position: ตรวจสอบตำแหน่งที่พบได้ตรงในหลอด	
Hg Lamp Deltas	
X -1 Y -6	OK
XUV 0	OK
Axial peak positions X3325 Y1205	OK
Radial peak positions X4111 Y1155	OK
Hg lamp peak positions X2215 Y2615	OK
Plasma Control ตรวจสอบการทำงานของพลาสมา	
(✓) Auto Start	OK
(✓) Extinguish	OK
(✓) RF power setting	OK
(✓) Igniter	OK
(✓) Air Knife	OK
Torch Gas ตรวจสอบการทำงานของแก๊สที่ใช้บนพลาสมา	
(✓) Coolant/Plasma Flow control	OK
(✓) Aux Flow	OK
(✓) Nebulizer Flow	OK
(✓) Optimize sample introduction function	OK
(✓) Peristaltic pump control	OK
(✓) Auto sampler Control	OK
(✓) Camera Support Module	OK
(✓) Diagnostic	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท สยามฟาร์ม เทคโนโลยี 1992 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

4. Cleaning & Replacement

Description	Status
(✓) O-Ring Torch replacement	OK
(✓) Pump Tubing replacement	OK
(✓) Glassware cleaning (Torch, Nebulizer, Spray chamber)	OK
(✓) Lube the roll peristaltic pump	OK
(✓) Optical windows cleaning	OK
(✓) Camera Water Re-circulator (water change/ refilled)	OK
(✓) RF Generator Water Re-circulator (water change/ refilled)	OK
(✓) Cleaning Electronics Board with spray cleaner	OK
(✓) Cleaning dust inside Unit	OK
(✓) Cleaning dust filter	OK

5. Safety Interlock

Description	Status
(✓) Door switch	OK
(✓) RF Water Re-circulator	OK
(✓) Camera Water Re-circulator	OK
(✓) Camera purge gas	OK
(✓) Argon pressure	OK
(✓) Nitrogen pressure	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท สยามฟาร์ม เทคโนโลยี 1992 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

6. Hardware Check with SALSAXE Diagnostics

Power Supply	Value	Status
-12 VDC (11 - 14.5 VDC)	-13.7 V	OK
+12 VDC (11 - 14.5 VDC)	14.01 V	OK
+3.3 VDC	3.28 V	OK
+5.0 VDC	4.95 V	OK
+13.5 VDC	13.46 V	OK

Plasma Generator	Value	Status
ICP Current 0.500A = 1kW	0.50 A	OK
ICP Ref 5.0Vdc = 1kW	5.47 V	OK
ICP Current 0.00 Vdc = 0kW	0	OK
ICP Ref 0.00Vdc = 0kW	0	OK
RF Water (Hz) OFF	0	OK
RF Water (Hz) ON	0	OK
Air Knife Pres. (0.00V) OFF	0	OK
Air Knife Pres. (3.0 - 7.0 V) ON	3.87 V	OK
Neb 25 @ setting of 25 PSI	25	OK
Cool 18 @ setting of 18 LPM	18	OK
Aux 0.6 @ setting of .6 LPM	0.6	OK
Pump Current (0.000 A) OFF	0	OK
Pump Voltage (0.000 V) OFF	0	OK
Pump Current (0.8 to 4.0A) ON	1.0 A	OK
Pump Voltage (8 to 13 V) ON	12.5 V	OK



Set Points	Value	Status
Air In Set Point 32°C	32	OK
Cam Tec Temperature -32°C	-32	OK
Op Purge Low 0.77 LPM	0.77	OK
Op Purge High 15.50 LPM	15.5	OK
Cam Wtr T 28°C	28.0	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGN 7

Customer: บริษัท อีทีแอล เทคโนโลยี จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	SN: P70177

7. Ma Check for performance Test

	Condition for performance Test	Condition Test	Status
Standard	1 ppm, 5 ppm, 10 ppm	10 ppm	ok
Power plasma	1.20 kw	1.2	ok
Plasma gas	16.0 LPM	16	ok
Auxiliary Gas	0.8 LPM	0.8	ok
Nebulizer	1.2 LPM	25 psi	ok
Pump Speed	25 RPM	25	ok
Integration time	15 s Axial, 5 s Radial	10 s, 5 s	ok
Nebulizer Type	Seaspray, Conical Meinhard	Conical	ok
Intensity first performance	1 ppm ≥ 4,000,000 5 ppm ≥ 15,000,000 10 ppm ≥ 50,000,000	64,343,426	ok

Engineer Sign	
 TELEDYNE LEE MAN LABS Everywhere you look	

STANDARD WEIGHT 50 g



Certificate No. : 19-045373

Page 1 of 3

Sample code : 19-15155-001

CERTIFICATE OF CALIBRATION

Customer

: EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapiban 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of calibration

: Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.
(Calibration Laboratory)

Equipment

: STANDARD WEIGHT 50 g

Manufacturer

: METTLER TOLEDO

Class

: F1

Serial No.

: N/A

ID No.

: LABE 10/1

Date of Receipt

: 30 May 2019

Date of Calibration

: 03 June 2019

Calibrated by

Approved by

Date of Issue

: 06 June 2019

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)



Certificate No. : 19-045373

Page 2 of 3

Sample code : 19-15155-001

REPORT OF CALIBRATION

Equipment :

STANDARD WEIGHT 50 g

Manufacturer :

METTLER TOLEDO

Class

F1

Serial No. :

N/A

ID No. :

LABE 10/1

Result of Calibration :

Conventional value of the result of weighing in air. For a weight taken at a reference temperature (t_{ref}) of 20 °C, the conventional mass is the mass of a reference weight of a density (ρ_{ref}) of 8000 kg.m⁻³ which it balances in air of a reference density (ρ_a) of 1.2 kg.m⁻³

Description	Deviation (mg)	Conventional Mass	Expanded Uncertainty (mg)	Maximum Permissible Error, OIML Class F1 \pm (mg)	ID No.
50 g	-0.317	49.999683 g	0.10	0.30	LABE 10/1

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

Certificate No. : 19-045373

Page 3 of 3

Sample code : 19-15155-001

REPORT OF CALIBRATION

Condition of Calibration

1. Ambient Conditions : Temperature $20^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$, Relative humidity $50\% \pm 10\%$ and air density 1.19 kg/m^3
2. Calibration Method : Direct comparison weighing according to OIML R111-1 : 2004(E)
3. Description of Calibrated Item :

Type and Nominal Value : Standard Weight 50 g

Shape : Cylindrical weight with knob

Case : Wood Box

4. Reference Standard Instrument

Instrument	Class	ID. No.	Certificate No.	Due date
1) STANDARD WEIGHT 1 mg to 1 kg	E2	LB-WE-57	B634921863	11 August 2019

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

- Through the reference standard laboratory of Mettler-Toledo GmbH, 8606 Greifensee, Switzerland (Instrument number 1).

6. Condition of Calibration item : Normal

End of Report

COPY

STANDARD WEIGHT 100 g



Certificate No. : 19-045374

Sample code : 19-15155-002

CERTIFICATE OF CALIBRATION

Customer

: EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapiban 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of calibration

: Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.
(Calibration Laboratory)

Equipment

: STANDARD WEIGHT 100 g

Manufacturer

: N/A

Class

: N/A

Serial No.

: N/A

ID No.

: LABE 10/2

Date of Receipt

: 30 May 2019

Date of Calibration

: 03 June 2019

Calibrated by

Approved by

Date of Issue

: 06 June 2019

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)



Certificate No. : 19-045374

Sample code : 19-15155-002

REPORT OF CALIBRATION

Equipment :

STANDARD WEIGHT 100 g

Manufacturer :

N/A

Class

N/A

Serial No. :

N/A

ID No. :

LABE 10/2

Result of Calibration :

Conventional value of the result of weighing in air. For a weight taken at a reference temperature (t_{ref}) of 20 °C, the conventional mass is the mass of a reference weight of a density (ρ_{ref}) of 8000 kg.m⁻³ which it balances in air of a reference density (ρ_o) of 1.2 kg.m⁻³

Description	Deviation (mg)	Conventional Mass	Expanded Uncertainty (mg)	ID No.
100 g	-0.24	99.99976 g	0.16	LABE 10/2

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3000



Certificate No. : 19-045374

Sample code : 19-15155-002

Page 3 of 3

REPORT OF CALIBRATION

Condition of Calibration

1. Ambient Conditions : Temperature $20^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$, Relative humidity $50\% \pm 10\%$ and air density 1.19 kg/m^3

2. Calibration Method : WI-CL-007 base on OIML R 111-1 : 2004(E)

3. Description of Calibrated Item :

Type and Nominal Value : Standard Weight 100 g

Shape : Cylindrical weight with knob

Case : Wood Box

4. Reference standard instrument

Instrument

Class	ID. No.	Certificate No.	Due date
1) STANDARD WEIGHT 1 mg to 1 kg E2	LB-WE-57	B634921863	11 August 2019

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

- Through the reference standard laboratory of Mettler-Toledo GmbH, 8606 Greifensee, Switzerland (Instrument number 1).

6. Condition of Calibration item : Normal

End of Report

COPIED

STANDARD WEIGHT 50 g



ASIA MEDICAL AND AGRICULTURAL LABORATORY
AND RESEARCH CENTER CO., LTD.

(Head Office) 361/1-4 Soi Ladprao 122, (Mahadithai 1), Ladprao Road, Phlabphla, Wangthonglang,
Bangkok, Thailand 10310 Tel:(66) 2-934-2381-3 Fax:(66) 2-934-0661

<http://www.amarc.co.th>
Email: c@amarc.co.th



NSC-TSI-ITS 17025
CALIBRATION 0152

Supersede to Calibration Certificate No. 19-053921

Certificate No. : 19-053921/1

Sample code : 19-17930-002

Page 1 of 3

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapiban 8 Rd., Nongkham,
Siracha, Chonburi 20230

Location of calibration : Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.
(Calibration Laboratory)

Equipment : STANDARD WEIGHT 50 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/4

Date of Receipt : 25 June 2019

Date of Calibration : 06 July 2019

Calibrated by

Approved by

Date of Issue : 16 September 2019

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)



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Bangkok, Thailand 10310 Tel:(66) 2-934-2381-3 Fax:(66) 2-934-0661

<http://www.amarc.co.th>
Email: c@amarc.co.th



NSC-TSI-ITS 17025
CALIBRATION 0152

Supersede to Calibration Certificate No. 19-053921

Certificate No. : 19-053921/1

Sample code : 19-17930-002

Page 2 of 3

REPORT OF CALIBRATION

Equipment : STANDARD WEIGHT 50 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/4

Result of Calibration : Without adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature (t_w) of 20 °C, the conventional mass is the mass of a reference weight of a density (ρ_w) of 8000 kg.m⁻³ which it balances in air of a reference density (ρ_a) of 1.2 kg.m⁻³

Description	Deviation (mg)	Conventional Mass	Expanded Uncertainty (mg)	ID No.
50 g	-0.060	#REF!	0.10	LABE 10/4

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003



ASIA MEDICAL AND AGRICULTURAL LABORATORY
AND RESEARCH CENTER CO., LTD.

(Head Office) 381,361/1-4 Soi Ladprao 122, (Mahadithul 1), Ladprao Road, Mahabul, Wangthonglang,
Bangkok, Thailand 10310 Tel:(66) 2-934-2381-3 Fax:(66) 2-934-0661

<http://www.amarc.co.th>
Email: cl@amarc.co.th



ISO/IEC 17025
CALIBRATION 0152

Supersede to Calibration Certificate No. 19-053921

Certificate No. : 19-053921/1

Sample code : 19-17930-002

Page 3 of 3

REPORT OF CALIBRATION

Condition of Calibration

1. Ambient Conditions : Temperature $20^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$, Relative humidity $50\% \pm 10\%$ and air density 1.19 kg/m^3

2. Calibration Method : WI-CL-007 base on OIML R 111-1 : 2004(E)

3. Description of Calibrated Item :

Type and Nominal Value : Standard Weight 50 g

Shape : Cylindrical weight with knob

Case : Wood Box

4. Reference standard instrument

Instrument	Class	ID. No.	Certificate No.	Due date
1) STANDARD WEIGHT 1 mg to 1 kg	E2	LB-WE-57	B634921863	11 August 2019

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

- Through the reference standard laboratory of Mettler-Toledo GmbH, 8606 Greifensee, Switzerland (Instrument number 1).

6. Condition of Calibration item : Normal

End of Report

THERMO-HYGROMETER

Model : 608-H1

Serial No. : 45106737



ASIA MEDICAL AND AGRICULTURAL LABORATORY
AND RESEARCH CENTER CO., LTD.

361,361/1-4 Soi Ladprao 122, (Mahadithai 1), Ladprao Road, Philadelphia,
Wangthonglang, Bangkok, Thailand 10310, Head Office
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http://www.amarc.co.th Email: d@amarc.co.th



NSC-TS1-TS 17025
CALIBRATION 0152

Certificate No. : 21-062722

Sample code : 21-24788-002

Page 1 of 2

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO.,LTD

683 Moo 11,Sukhapiban 8 Rd.Nongkham,

Siracha,Chonburi 20230

Location of calibration : Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.
(Calibration laboratory)

Equipment : Digital thermo-hygrometer

Manufacturer : Testo Model : 606-H1

Serial No. : 45106737 ID No. : LABE 09/7

Date of receipt : 23 July 2021 Date of calibration : 29 July 2021

Condition of calibration

1 Environment Ambient temperature : 23.0 °C ± 3.0 °C

Relative humidity : 55.0 % ± 15.0 %

2 Calibration method

2.1 In-house method : WI-CL-045 By comparison with thermometer standard / chilled mirror hygrometer in controlled chamber.

2.2 The calibration by comparison unit under calibration (UUC) to the thermometer standard / chilled mirror hygrometer in controlled chamber in a chamber at the controlled temperature/ relative humidity.

3 Reference standard instrument

Instrument	Model	Code No.	Certificate No.	Due date
3.1 Chilled Mirror	Optidew Vision	LB-DP-02 & LB-DP-02 (DP)	TH-0018-21	10 March 2022
3.2 Digital Thermometer	Optidew Vision	LB-DP-02 & LB-DP-02 (Temp.)	21-032217	06 April 2022
3.3 Digital Thermometer	34972A	LB-DA-07 with RTD-89	20-085967	17 September 2021

4 This certificate is traceable to the international system of unit (SI Unit)

4.1 Instrument No.3.1 through : National Institute of Metrology (Thailand)

4.2 Instrument No.3.2 and 3.3 through : Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.

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

6 Condition of calibration item : Normal

Calibrated by

Approved by

Date of issue

11 August 2021

The calibration result is applied only to the above calibrated item and was found accurate as shown on measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)



ASIA MEDICAL AND AGRICULTURAL LABORATORY
AND RESEARCH CENTER CO., LTD.

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http://www.amarc.co.th Email: d@amarc.co.th



NSC-TS1-TS 17025
CALIBRATION 0152

Certificate No. : 21-062722

Sample code : 21-24788-002

Page 2 of 2

REPORT OF CALIBRATION

Results of calibration

- Temperature measurement

Resolution of unit under calibration : 0.1 °C

Range : 0 °C to 50 °C

Calibration point °C	Average of standard reading		Unit under calibration		Expanded uncertainty °C
	Controlled humidity %RH	Temperature °C	Average reading °C	Correction value °C	
20	50	20.02	20.1	- 0.08	± 0.40
25	50	25.02	25.0	+ 0.02	± 0.40
30	50	30.00	29.7	+ 0.30	± 0.40

- Humidity measurement

Resolution of unit under calibration : 0.1 %RH

Range : 10 %RH to 95 %RH

Calibration point %RH	Average of standard reading		Unit under calibration		Expanded uncertainty %RH
	Air temperature °C	Calculated humidity %RH	Average reading %RH	Correction value %RH	
45	25.00	45.13	52.4	- 7.27	± 1.3
60	25.00	60.03	67.5	- 7.47	± 1.5
75	25.00	75.20	82.5	- 7.30	± 1.7

Note

- Calibration results without adjustment

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2.00, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

End of report

ANALYTICAL BALANCE (DU)

Model : XS205 DU

Serial No. : 1126323724

Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5 Lesalle Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10260
+66 2723 0382
MT-TH.ServiceSupport@mt.com



Accuracy Calibration Certificate

Customer

Company: EASTERN THAI CONSULTING 1992 CO., LTD.
Address: 883 Moo 11, Sukhaphiban 8 Rd., Nong Kham
City: Sriracha
Zip / Postal: 20230
State / Province: Chonburi
Order Number: 033296644

Contact:

Weighing Device

Manufacturer: Mettler Toledo
Model: XS205DU
Serial No.: 1126323724
Building: Laboratory
Floor: 1
Room: Laboratory
Instrument Type: Weighing Instrument
Asset Number: LABE 05/1
Terminal Model: SAT
Terminal Serial No.: 1126323724
Terminal Asset No.: N/A

Range	Max. Capacity	Readability (g)
1	81 g	0.00001 g
2	220 g	0.0001 g

Procedure

Calibration Guideline: EURAMET cp-18 v. 4.0 (11/2015)
CPTW002/20

This calibration certificate contains measurements for As Found calibration. No As Left calibration was performed because the device was not modified after As Found calibration. Therefore, results for As Left correspond to As Found.

The sensitivity/span of the weighing instrument was adjusted before calibration with a built-in weight.

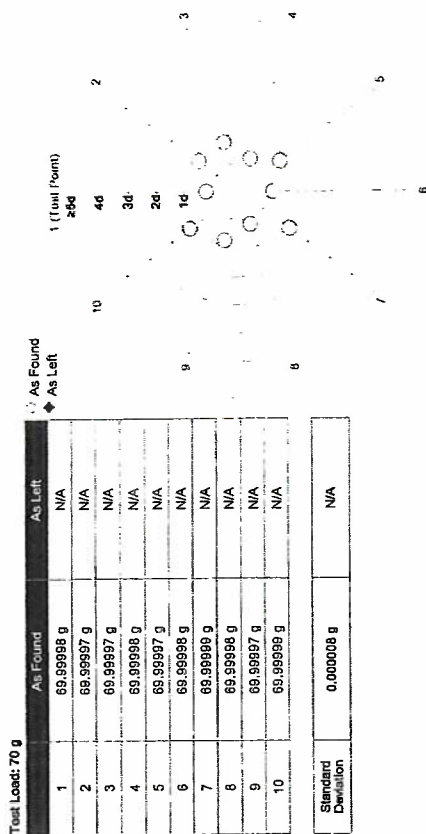
In accordance with EURAMET cp-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

As Found	Start: 26.9 °C	End: 26.8 °C	Start: 73.8 %	End: 71.9 %
----------	----------------	--------------	---------------	-------------

As Found Calibration Date: 22-Jul-2021
As Left Calibration Date: N/A
Issue Date: 23-Jul-2021
Calibrator: [Redacted]
Approved Signatory: [Redacted]

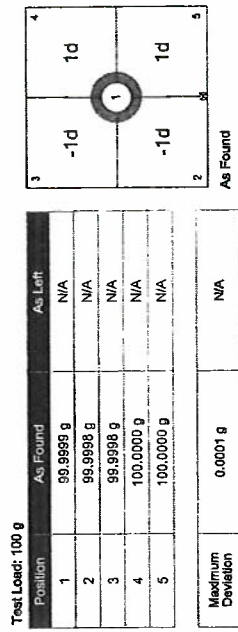
Measurement Results

Repeatability



The "g" in the graph represents the readability of the range/interval in which the test was performed.
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

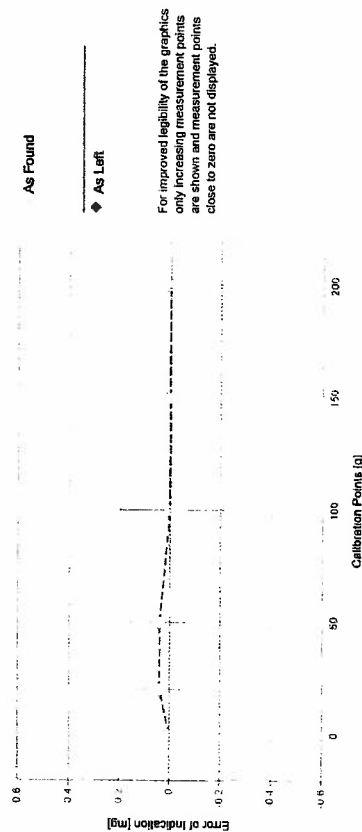


The "g" in the graph represents the readability of the range/interval in which the test was performed.

Error of Indication

As Found				
Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1 0.00000 g	0.00000 g	0.00000 g	0.017 mg	2
2 0.01000 g	0.01000 g	0.00000 g	0.019 mg	2
3 0.10000 g	0.09999 g	-0.00001 g	0.023 mg	2
4 1.00000 g	1.00000 g	0.00000 g	0.032 mg	2
5 4.99998 g	5.00000 g	0.00002 g	0.048 mg	2
6 9.99999 g	10.00001 g	0.00002 g	0.061 mg	2
7 20.00001 g	20.00005 g	0.00004 g	0.082 mg	2
8 49.99993 g	49.99997 g	0.00004 g	0.12 mg	2
9 99.9999 g	99.9999 g	0.0000 g	0.21 mg	2
10 149.9998 g	149.9998 g	0.0000 g	0.32 mg	2
11 199.9998 g	199.9998 g	0.0000 g	0.37 mg	2

*The calculated uncertainty was replaced by the CMC (Calibration and Measurement Capabilities) value because the calculated uncertainty was smaller than the CMC value.



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor k – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML E2

Weight Set No.: WS28

Date of Issue: 17-Nov-2020

Certificate Number: 170241

Calibration Due Date: 15-May-2022

Thermo Hygrometer

Equipment No.: IN51

Date of Issue: 02-Mar-2021

Certificate Number: 211403

Calibration Due Date: 23-Feb-2022

Remarks

FACT adjustment functionality activated

Equipment condition: Good

Next calibration according to customer's procedure

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

Measurement Uncertainty of the Weighing Instrument In Use

Stated is the expanded uncertainty with $k=2$ in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: $1.5 \cdot 10^{-2} / K$

Temperature range on site for the evaluation of the measurement uncertainty in use: 5 K

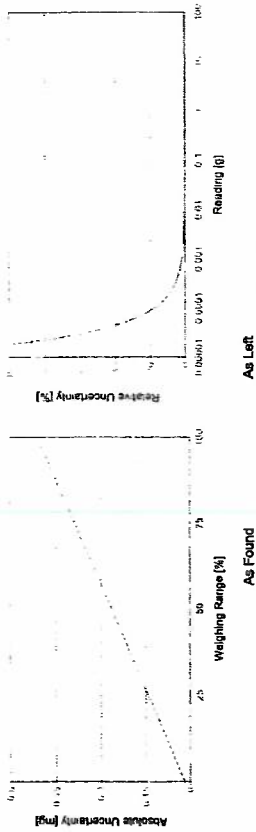
Uncertainty of Uncertainty Equation

Range g	As Found		As Left
	Min	Max	
1 0.0001 g	81 g	$U_1 = 0.018 \text{ mg} + 0.00808 \text{ mg/g} \cdot R$	N/A
2 0.0001 g	220 g	$U_2 = 0.06 \text{ mg} + 0.00803 \text{ mg/g} \cdot R$	N/A

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty In Use for Various Net Indications (Examples)

Net Indication	As Found		As Left
	As Found	As Left	
0.00220 g	0.018 mg	0.82%	N/A
0.02200 g	0.018 mg	0.082%	N/A
0.22000 g	0.019 mg	0.0088%	N/A
2.20000 g	0.031 mg	0.0014%	N/A
220.0000 g	1.4 mg	0.00063%	N/A



The weighing range shown in the absolute uncertainty graph refers to the first interval/range of the device.



GWP® Certificate

As Found



As Left



The weighing device meets the given process requirements.

The weighing device meets the given process requirements.

Tests Performed:



As Found



As Left

No adjustments/modifications made. As Left results correspond to As Found.

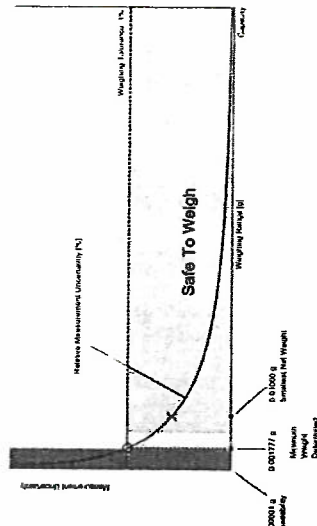
Process Requirements

Weighing Tolerance: 1%

Smallest Net Weight: 0.01000 g

Safety Factor: 2

Safe Weighing Range



While the values in this graph reflect the actual calibration results, the measurement uncertainty curves are simply a visual representation. The graph reflects As Left testing, unless only As Found was performed.

Minimum Weight

As Found Minimum Weight Table

Range 1

Minimum weights for different weighing tolerances and safety factors					
Tolerance	1	2	3	5	10
0.1%	0.017873 g	0.035965 g	0.054282 g	0.091605 g	0.189140 g
0.2%	0.008909 g	0.017873 g	0.026891 g	0.045095 g	0.091605 g
0.5%	0.003557 g	0.007123 g	0.010687 g	0.017873 g	0.035965 g
1%	0.001777 g	0.003557 g	0.005339 g	0.008909 g	0.017873 g
2%	0.000888 g	0.001777 g	0.002687 g	0.004448 g	0.008909 g
5%	0.000355 g	0.000711 g	0.001066 g	0.001777 g	0.003557 g

The minimum weight table applies to the fine range of the weighing device.

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

As Left Minimum Weight Table

Range 1

Minimum weights for different weighing tolerances and safety factors					
Tolerance	1	2	3	5	10
0.1%	0.017873 g	0.035965 g	0.054282 g	0.091605 g	0.189140 g
0.2%	0.008909 g	0.017873 g	0.026891 g	0.045095 g	0.091605 g
0.5%	0.003557 g	0.007123 g	0.010687 g	0.017873 g	0.035965 g
1%	0.001777 g	0.003557 g	0.005339 g	0.008909 g	0.017873 g
2%	0.000888 g	0.001777 g	0.002687 g	0.004448 g	0.008909 g
5%	0.000355 g	0.000711 g	0.001066 g	0.001777 g	0.003557 g

The minimum weight table applies to the fine range of the weighing device.

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1/1 (no safety factor), 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with $k = 2$ and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

Measurement Results

Results Summary

Repeatability			Eccentricity			Error of Indication		
As Found	As Left		As Found	As Left		As Found	As Left	
✓	✓		✓	✓		✓	✓	

✓ = Passed

✗ = Failed

A = Safety Factor not met

Repeatability

Test Load: 70 g

Tolerance			As Found			As Left		
	Control Limit		Std. Deviation	Result		Std. Deviation	Result	
0.1%	0.000005 g			✗			✗	
0.2%	0.000010 g			✓			✓	
0.5%	0.000025 g			✓			✓	
1%	0.000050 g		0.000008 g	✓		0.000008 g	✓	
2%	0.000100 g			✓			✓	
5%	0.000250 g			✓			✓	

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

Eccentricity

Test Load: 100 g

Tolerance			As Found			As Left		
	Control Limit		Deviation	Result		Deviation	Result	
0.1%	0.0500 g			✓			✓	
0.2%	0.1000 g			✓			✓	
0.5%	0.2500 g			✓			✓	
1%	0.5000 g		0.0001 g	✓		0.0001 g	✓	
2%	1.0000 g			✓			✓	
5%	2.5000 g			✓			✓	

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

Attachment to Calibration Certificate:
TH2046-059-07221-ACC-TH
GWP® Certificate
Error of Indication

As Found

Reference Value	Error	Control limits for various weighing tolerances				
		0.1%	0.2%	0.5%	1%	5%
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A
20.00001 g	0.00004 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.50000 g
49.99993 g	0.00004 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	1.25000 g
99.99990 g	0.00000 g	0.05000 g	0.10000 g	0.25000 g	0.50000 g	2.50000 g
149.99998 g	0.00000 g	0.07500 g	0.15000 g	0.37500 g	0.75000 g	3.75000 g
199.99998 g	0.00000 g	0.10000 g	0.20000 g	0.50000 g	1.00000 g	5.00000 g
Result		✓	✓	✓	✓	✓

As Left

Reference Value	Error	Control limits for various weighing tolerances				
		0.1%	0.2%	0.5%	1%	5%
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A
20.00001 g	0.00004 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.50000 g
49.99993 g	0.00004 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	1.25000 g
99.99990 g	0.00000 g	0.05000 g	0.10000 g	0.25000 g	0.50000 g	2.50000 g
149.99998 g	0.00000 g	0.07500 g	0.15000 g	0.37500 g	0.75000 g	3.75000 g
199.99998 g	0.00000 g	0.10000 g	0.20000 g	0.50000 g	1.00000 g	5.00000 g
Result		✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.

Service Date: 2021-07-22
Document Number: TH2046-562-07221-LABBalanceHR
EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhaphiban 8 Rd., Nong Kham, Sriracha, Chonburi 20230
Saisiporn Nakin

Balance Health Report

System Details	
Manufacturer:	Mettler Toledo
Model:	XS205DU
Serial number:	1126323724
Firmware:	4.00 / 5.81
Weight set for routine testing:	Yes /

Device History		Service History	
Instrument in use:	Yes	Last preventive maintenance:	< 1 year
Instrument age:	> 10 years	Last instrument calibration:	< 1 year
Spare parts available:	Yes	Last minimum weight determination:	Never
Regulations:	ISO	Routine testing performed:	Yes
Process tolerance in %:	1%		
Smallest sample net weight:	0.01000 g		

Check List	
Room temperature fluctuation	✓
Exposure to direct sun	✓
Vibrations	✓
Draft	✓
Dirt or dust	✓
Static	✓
Draft shield	✓
Weighting pan position	✓
Housing	✓
Other - objections noted as additional remarks	—
Recommendations	—

Measurement Result Quality		Process Efficiency	
Instrument calibration	Uninstall instrument		
Identify safe weighing range	Replace instrument		
GWP verification / risk assessment	Yes		
Preventive maintenance	Replace / add parts (see additional remarks)		
Perform routine testing with test weights	Onsite repair		
User training	Depot repair		
	Use of accessories (see additional remarks)		

Additional Remarks & Recommendations		Engineer Details	
Contact Name:	Saisiporn Nakin	Position:	Phone: 0860513303 Email: ds.jab@mt1992.com
Additional Remarks & Recommendations		Date:	22-Jul-2021
		Name:	Paipat Sweatperuwat
		Signature:	

This is not a certificate.
It should not be used to interpret final results for the testing of these devices.

Legend: ✓ Good/Pass ✗ Needs Attention ✗ Bad/Fail — Not Applicable

ATOMIC ABSORPTION SPECTROPHOTOMETER

Varian Model : Spectr AA-240FS

Serial No. : EL07053792

CERTIFICATE OF INTERNAL CALIBRATION

NOMENCLATURE: 1. Atomic Absorption Spectrophotometer "VARIAN"

Model Spectr AA – 240FS S/N EL07053792

1. Working standard solution "MERCCK"

Chromium	Lot No.	HC99974679	Expire date	June 2022
Copper	Lot No.	HC90773586	Expire date	December 2022
Nickel	Lot No.	HC90700592	Expire date	September 2022
Iron	Lot No.	HC02468981	Expire date	June 2024
Lead	Lot No.	HC91308676	Expire date	December 2022

CALIBRATION PROCEDURE: W1-LAB-020 Internal Calibration Method of AAS

REFERENCE STANDARD Reference Material traceable to NIST "AcquaStandard"

Copper	Lot No.	220115154	Expire date	December 2022
Nickel	Lot No.	220115154	Expire date	December 2022
Iron	Lot No.	220115154	Expire date	December 2022
Chromium	Lot No.	220115154	Expire date	December 2022
Lead	Lot No.	220115154	Expire date	December 2022

CALIBRATION RANGE: 0.10, 0.25, 0.50, 1.00, 2.00 mg/l at 217.0, 232.0, 248.3, 324.8 and 357.9 nm

AMBIENT CONDITION: Temperature 25.0 ± 5.0 °C

Relative Humidity 60.0 ± 15 %RH

The Testing Laboratory has calibrated Atomic Absorption Spectrophotometer set against Reference Material (RM) traceable to National Institute of Standard and Technology (NIST). The result are attached herewith



Appr

The above result are valid exclusively for the calibrated item (s) as mention in this certificate

Advertising the Certificate and publicity of the result except in full are prohibited unless written permission is obtained form Laboratory Manager of ETC

FM-LAB-088 / 1 / 24-08-47

INTERNAL CALIBRATION REPORT

NOMENCLATURE: 1. Atomic Absorption Spectrophotometer "VARIAN"

Model Spectra AA – 240FS S/N EL07053792

2. Working standard solution "MERCCK"

Chromium	Lot No.	HC99974679	Expire date	June 2022
Copper	Lot No.	HC90773586	Expire date	December 2022
Nickel	Lot No.	HC90700592	Expire date	September 2022
Iron	Lot No.	HC02468981	Expire date	June 2024
Lead	Lot No.	HC91308676	Expire date	December 2022

CALIBRATED DATE: January 05, 2022

CALIBRATE BY: Mr.Channarong Tungthammarak

CALIBRATION PROCEDURE: W1-LAB-020 Internal Calibration Method of AAS

CALIBRATION RANGE: 0.10, 0.25, 0.50, 1.00, 2.00 mg/l at 217.0, 232.0, 248.3, 324.8 and 357.9 nm

AMBIENT CONDITION: Temperature 25.0 ± 5.0 °C

Relative Humidity 60.0 ± 15 %RH

CALIBRATION DATA

1. Noise Level In term of Standard Deviation

Standard	Chromium	Copper	Nickel	Iron	Lead
Deviation	0.00025	0.00006	0.00041	0.00057	0.00020

2. Repeatability

Standard	Concentration of Standard (mg/l)									
	Chromium					Copper				
	0.10	0.50	2.00	0.10	0.50	2.00	0.10	0.50	2.00	0.10
Standard Deviation	0.00015	0.00014	0.00137	0.00011	0.00041	0.08000	0.00031	0.00049	0.00053	0.00033
Average Absorbance	0.0078	0.0389	0.1484	0.0133	0.0654	0.2530	0.0090	0.0469	0.1794	0.00020

Standard	Concentration of Standard (mg/l)									
	Iron					Lead				
	0.10	0.50	2.00	0.10	0.50	2.00	0.10	0.50	2.00	0.10
Standard Deviation	0.00028	0.00038	0.00101	0.00020	0.00018	0.00064	0.00031	0.00049	0.00053	0.00033
Average Absorbance	0.0078	0.0389	0.1531	0.0042	0.0188	0.0098	0.0090	0.0469	0.1794	0.00020

The above result are valid exclusively for the calibrated item (s) as mention in this certificate

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FM-LAB-088 / 1 / 24-08-47

3. Reading on Wavelength – Chromium at 357.9 nm

Standard Value of RM (mg/l)	Reading (mg/l)	Error of measurement (mg/l)	Uncertainty (mg/l)
Cr 0.100	0.081	-0.019	± 0.006
0.500	0.468	-0.032	± 0.025
2.000	1.874	-0.126	± 0.106

4. Reading on Wavelength – Copper at 324.8 nm

Standard Value of RM (mg/l)	Reading (mg/l)	Error of measurement (mg/l)	Uncertainty (mg/l)
Cu 0.100	0.096	-0.004	± 0.005
0.500	0.514	+0.014	± 0.026
2.000	2.048	+0.048	± 0.104

5. Reading on Wavelength – Nickel at 332.0 nm

Standard Value of RM (mg/l)	Reading (mg/l)	Error of measurement (mg/l)	Uncertainty (mg/l)
Ni 0.100	0.092	-0.008	± 0.016
0.500	0.511	+0.011	± 0.032
2.000	1.962	-0.038	± 0.099

6. Reading on Wavelength – Iron at 248.3 nm

Standard Value of RM (mg/l)	Reading (mg/l)	Error of measurement (mg/l)	Uncertainty (mg/l)
Fe 0.100	0.099	-0.001	± 0.014
0.500	0.510	+0.010	± 0.029
2.000	1.996	-0.004	± 0.105

7. Reading on Wavelength – Lead at 217.0 nm

Standard Value of RM (mg/l)	Reading (mg/l)	Error of measurement (mg/l)	Uncertainty (mg/l)
Pb 0.100	0.097	-0.003	± 0.013
0.500	0.519	+0.019	± 0.031
2.000	2.084	+0.084	± 0.114

Approved

The above result are valid exclusively for the calibrated item (s) as mention in this certificate. Advertising the Certificate and publicity of the result except in full are prohibited unless written permission is obtained from Laboratory Manager of ETC

FM-LAB-088 / 1 / 24-08-47

BAROMETER

Equipment : Analog Barometer

ID No. / Tag No. : BM001/41



MIRACLE INTERNATIONAL TECHNOLOGY CO., LTD
214 Bangwaek Rd. Bangpai Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



ESTABLISHED 1992
CALIBRATION 002

CALIBRATION CERTIFICATE

Certificate No. : AD2106-032-0001

Date Issued : 04-Jun-21

Customer : Eastern Thai Consulting 1992 Co., Ltd.
683 Moo 11 Sukhapibam 8 Rd., Nongkham, Sriracha, Chonburi 20230

Equipment : Analog Barometer

Manufacturer : Barigo
Model : -
Serial No. : -
ID No./Tag No. : BM001/41
Date Received : 02-Jun-21
Date Calibrated : 04-Jun-21

Calibrated by : [REDACTED]

Calibration Method or Calibration Procedure Used

In-house method : CP-21 base on DKD-R 6-1: Edition 3 2014.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Technical Manager, Miracle International Technology Company Limited.

Approved by :



Page 1 of 2

Certificate No. : AD2106-032-0001

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

STD Reading hPa	UUC Reading (hPa) Before Adjusted	UUC Reading (hPa) After Adjusted	UUC Error hPa	Uncertainty \pm hPa
990.00	990.0	-	0.00	0.91
1000.00	1000.0	-	0.00	0.91
1010.00	1010.0	-	0.00	0.91
1020.00	1020.0	-	0.00	0.91
1030.00	1030.0	-	0.00	0.91

STD = Standard

UUC = Unit Under Calibration

Calibrated condition : Pressure Medium Air : Density $\approx 1.19 \text{ kg/m}^3$ @ 20°C , 1 bar
Mounting Position Vertical
Reference Level at center of its dial

Description of UUC :
Range 955 - 1075 hPa Absolute
Calibration Range 990 - 1030 hPa Absolute
Scale Interval 1 hPa
Resolution 0.5 hPa Absolute

Measurement Standards Used & Traceability :

The International System of Units (SI) through

IRPC Certificate No. CL1-P21.0029 for Digital Barometer Serial No. 290185, Due 19-Oct-21

End of Certificate

Page 2 of 2

Hot Air Oven

Model : UM 400

Serial No. : 900982



ASIA MEDICAL AND AGRICULTURAL LABORATORY
AND RESEARCH CENTER CO., LTD.

361/361/1-4 Soi Ladprao 122, (Mahachulalongkornrajavidyalaya) Road, Phaholajungsri,
Wangthonglang, Bangkok, Thailand 10310, Head Office
Tel:(66) 2-934-2381-3 Fax:(66) 2-934-0661
http://www.amarc.co.th Email: c@amarc.co.th



NSC-TIS-TIS 17025
CALIBRATION 0152

Certificate No. : 21-049716
Sample code : 21-19686-006

Page 1 of 3

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.

683 Moo 11, Sukhapiban 8 Rd., Nongkham,

Siracha, Chonburi 20230

Location of calibration : EASTERN THAI CONSULTING 1992 CO., LTD.

(Hot Lab)

Equipment : Temperature controlled enclosures (Hot air oven)

Manufacturer : Memmert Model : UM 400

Serial No. : 900982 ID No. : LABE 17/1

Date of receipt : 09 June 2021 Date of calibration : 09 June 2021

Condition of calibration

1 Environment Ambient temperature : Maximum 32.7 °C ; Minimum 30.1 °C
Relative humidity : Maximum 60.3 % ; Minimum 44.1 %
Line voltage supplied : Maximum 228.5 VAC ; Minimum 221.3 VAC

2 Calibration method : TIAS-G-20 : Guidelines for calibration and checks of temperature controlled enclosures

Reference standard instrument

Instrument	ID.No.	Certificate No.	Due date
Data Acquisition With Sensor (RTD-P100)	LB-DA-12 (RTD-178 to RTD-186)	21-038924	06 May 2022

4 This certificate is traceable to the international system of unit (SI Unit)

The measurement is traceable to Thailand Institute of Scientific and Technological Research through Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.

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

6 Condition of calibration item : Normal

Calibrated by

Approved by

Date of issue

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)



ASIA MEDICAL AND AGRICULTURAL LABORATORY
AND RESEARCH CENTER CO., LTD.

361/361/1-4 Soi Ladprao 122, (Mahachulalongkornrajavidyalaya) Road, Phaholajungsri,
Wangthonglang, Bangkok, Thailand 10310, Head Office
Tel:(66) 2-934-2381-3 Fax:(66) 2-934-0661
http://www.amarc.co.th Email: c@amarc.co.th



NSC-TIS-TIS 17025
CALIBRATION 0152

Certificate No. : 21-049716
Sample code : 21-19686-006

Page 2 of 3

REPORT OF CALIBRATION

Results of calibration

Resolution : 0.1 °C

1. Reporting of temperature

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Measured temperature at Each Positions (°C)								Uncertainty ± (°C)	Coverage factor k	
			#1	#2	#3	#4	#5	#6	#7	#8			#9 ^{ref}
85	85.0	85.0	84.98	84.92	84.61	84.66	84.93	84.88	84.93	84.82	84.92	0.27	2.00

2. Characterization result

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
85	0.16	0.32	0.67

Note

UUC* = Unit Under Calibration



ASIA MEDICAL AND AGRICULTURAL LABORATORY
AND RESEARCH CENTER CO., LTD.

361/361/1-4 Soi Ladprao 122, (Mahaadithai 1), Ladprao Road, Phlaophla,
Wangthonglang, Bangkok, Thailand 10310, Head Office
Tel:(66) 2-934-2381-3 Fax:(66) 2-934-0651
http://www.amarc.co.th Email: cl@amarc.co.th



NSC-TS-1515 17025
CALIBRATION 0152

Certificate No. : 21-049716

Sample code : 21-19686-006

Page 3 of 3

REPORT OF CALIBRATION

Results of calibration

Note

1 Sensor installation locations

1.1 All sensors at any corners or walls should be positioned

5 cm (a x b x c) from the wall.

1.2 The reference sensor is preferably located of the geometric

center of the chamber.

2 Interior dimensions approx of chamber ;

W = 40 cm ; D = 28 cm ; H = 39 cm

3 Air valve or fresh air level : Off

4 Fan level : Open

5 The quoted uncertainty include " Stability of chamber and loading

effect in chamber at 20% of uniformity ".

6 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.

7 Temperature stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

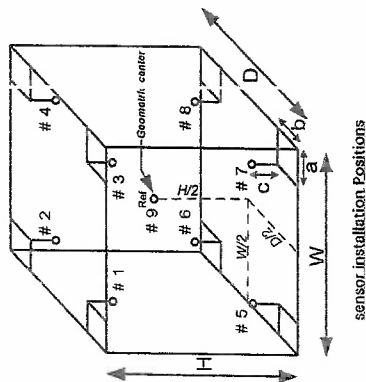
8 Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.

9 UUC* Reading - the average reading of indicating device that forms the integral part of the enclosure.

10 Calibration results without adjustment.

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M30

End of report



INDUCTIBELY COUPLED PLASMA SPECTROMETER

Model : Prodigy 7

Serial No. : P70177



บริษัท แอปพลิเคชัน ดีไซน์ จำกัด
Application Define Company Limited
8/4 ซอย บางซื่อเอก 9 แขวง บางพลี เขต คลองสามวา กรุงเทพมหานคร 10170
8/4 Soi Bangsueekong 9 Bangkokrom Talingchan, Bangkok 10170
Tel: (66) 2864 7137 E-mail: support@apdefine.co.th Website : http://www.apdefine.co.th
เลขประจำตัวผู้เสียภาษี 0105656032481

CERTIFICATE OF INSTRUMENT PERFORMANCE

INSTRUMENT:		INDUCTIVELY COUPLED PLASMA SPECTROMETER
BRAND:	Telodyne Leeman Labs	
MODEL:	Prodigy 7	
SERIAL NO.	P70177	
CUSTOMER:	Eastern Thai Consulting 1992 Co., Ltd	
CHECKING:	SPECTROMETER	STATUS
	Wavelength Accuracy check by use emission line of Hg Lamp	
	Mercury line 253.652 nm.	OK.....
	Plasma View (Dual View)	OK.....
	CMOS Detector check	OK.....
	Align View by Mn line 257.610 nm.	OK.....
	RF GENERATOR	OK.....
	Incident Power 1,200 ±10 Watt Reading = ...1.2.... Watt	
	SAMPLE INTRODUCTION	OK.....
	Plasma Torch, Injector, Spray chamber, Nebulizer	OK.....
	Peristaltic pump & Tubing	OK.....
	EXHAUSTING & COOLING SYSTEM	OK.....
	Safety Interlock Switch (Door, Argon pressure, Water pressure)	OK.....
	Cooling System, water flowrate & low pressure switch	OK.....
	Flowrate of Air blower	OK.....
	COMPUTER & SOFTWARE	OK.....
	Plasma Ignition software & Analytical Software	
	ANALYTICAL TEST	OK.....
	Full Frame Capture & Echellogram check	OK.....
	Calibration Curve & QC Test	OK.....

DATE : December 21, 2021

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีสเทิร์นไทย คอนซัลติง 1992 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

1. Gas Supply /Water Re-circulator/Exhaust Hood Check:

Gas system: ตรวจสอบแก๊สและการทำงาน	Argon Pressure: 95 psi Nitrogen Pressure: 10 psi Oxygen Pressure: 10 psi	Leak inspected (✓) No leak Leak inspected (✓) No leak Leak inspected (✓) No leak
(✓) Change camera purge gas Dehydrator (1 times /years) Next time replacement <u>check</u> เปลี่ยนตัวดูดความชื้นดีไฮเดรต ทุก 1 ปี		
Water Chiller: RF generator flow rate 414 LPM Temperature 26 C ตรวจอุณหภูมิ	Leak inspected (✓) No leak ตรวจการรั่วซึม	
Water Chiller : Camera	(✓) check water level and refill ตรวจระดับน้ำและเติมน้ำ (✓) change water เปลี่ยนน้ำ Temperature 29.9 °C ตรวจอุณหภูมิ	
Exhaust Hood Flow rate 650 CFM (system request > 150)		

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีลาร์ฟาร์ม เทคโนโลยี 1992 จำกัด Date: December 21, 2021

Instrument: ICP-OES Model: Prodigy 7 S/N: P70177

2. Computer & Software Checks

Description	Status
Interface Cable USB (✓) No broken	OK
Software Version	OK
(*) Operation function check :	OK
(*) Open /Save /Edit method	OK
(*) Instrument Control	OK
(*) Sequence	OK
(*) Full Frame Capture (Echelle Mode)	OK
(*) Auto alignment /Hg alignment	OK
(*) Calibration Curve	OK
(*) Re-Calculation	OK
(*) Print Report	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีลาร์ฟาร์ม เทคโนโลยี 1992 จำกัด Date: December 21, 2021

Instrument: ICP-OES Model: Prodigy 7 S/N: P70177

3. Instrument Control

Description	Status
Optical view position: ตรวจสอบตำแหน่งที่มองเห็นได้ชัดเจน	
Hg Lamp Delta	
X -1 Y -6	OK
XUV 0	OK
Axial peak positions X3325 Y1205	OK
Radial peak positions X4111 Y1185	OK
Hg lamp peak positions X2215 Y2615	OK
Plasma Control: ตรวจสอบการทำงานจากจุดและค่าพลาสมา	
(*) Auto Start	OK
(*) Extinguish	OK
(*) RF power setting	OK
(*) Igniter	OK
(*) Air Knife	OK
Torch Gas: ตรวจสอบการทำงานและค่าที่ใช้ในพลาสมา	
(*) Coolant /Plasma Flow control	OK
(*) Aux Flow	OK
(*) Nebulizer Flow	OK
(*) Optimize sample introduction function	OK
(*) Peristaltic pump control	OK
(*) Auto sampler Control	OK
(*) Camera Support Module	OK
(*) Diagnostic	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีทีแอล เทคโนโลยี จำกัด 1992 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	SN: P70177

4. Cleaning & Replacement

Description	Status
✓ O-Ring Torch replacement	OK
✓ Pump Tubing replacement	OK
✓ Glassware cleaning (Torch, Nebulizer, Spray chamber)	OK
✓ Lube the roll peristaltic pump	OK
✓ Optical windows cleaning	OK
✓ Camera Water Re-circulator (water change/ refilled)	OK
✓ RF Generator Water Re-circulator (water change/ refilled)	OK
✓ Cleaning Electronics Board with spray cleaner	OK
✓ Cleaning dust inside Unit	OK
✓ Cleaning dust filter	OK

5. Safety Interlock

Description	Status
✓ Door switch	OK
✓ RF Water Re-circulator	OK
✓ Camera Water Re-circulator	OK
✓ Camera purge gas	OK
✓ Argon pressure	OK
✓ Nitrogen pressure	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีทีแอล เทคโนโลยี จำกัด 1992 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	SN: P70177

6. Hardware Check with SALSA.EXE Diagnostics

Power Supply	Value	Status
-12 VDC (11 - 14.5 VDC)	-13.97	OK
+12 VDC (11 - 14.5 VDC)	12.97	OK
+3.3VDC	3.28	OK
+5.0 VDC	4.95	OK
+13.5 VDC	13.46	OK

Plasma Generator	Value	Status
ICP Current 0.500A = 1kW	9.54	OK
ICP Ref 5.0Vdc = 1kW	5.47	OK
ICP Current 0.00 Vdc = 0kW	0	OK
ICP Ref 0.00Vdc = 0kW	0	OK
RF Water (Hz) OFF	0	OK
RF Water (Hz) ON	2.5	OK
Air Knife Pres. (0.00V) OFF	0	OK
Air Knife Pres. (3.0 - 7.0 V) ON	3.47	OK
Neb 25 @ setting of 23 PSI	2.5	OK
Cool 18 @ setting of 18 LPM	1.9	OK
Aux 0.6 @ setting of 6 LPM	2.6	OK
Pump Current (0.000 A) OFF	0	OK
Pump Voltage (0.000 V) OFF	0	OK
Pump Current (0.8 to 4.0A) ON	1.04	OK
Pump Voltage (8 to 13 V) ON	12.52	OK


Set Points	Value	Status
Air In Set Point 32°C	32	OK
Cam Tee Temperature -32°C	-32	OK
Op Purge Low 0.77 LPM	0.77	OK
Op Purge High 15.50 LPM	15.5	OK
Cam Wtr T 28°C	28.02	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท สยามฟาร์ม จำกัด 1982 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

7. Ma Check for performance Test

	Condition for performance Test	Condition Test	Status
Standard	1 ppm, 5 ppm, 10 ppm	10 ppm	ok
Power plasma	1.20 kw	1.2	ok
Plasma gas	16.0 LPM	16	ok
Auxiliary Gas	0.8 LPM	0.8	ok
Nebulizer	1.2 LPM	25, 105 i	ok
Pump Speed	25 RPM	25	ok
Integration time	15 s Axial, 5 s Radial	105, 55	ok
Nebulizer Type	Senspray, Conical, Meinhard	Conical	ok
Intensity first performance	1 ppm ≥ 4,000,000 5 ppm ≥ 15,000,000 10 ppm ≥ 50,000,000	64,343,928	ok

Engineer Sign	 <p>TELEDYNE LEEMAN LABS Everywhere you look</p>
---------------	--

STANDARD WEIGHT 50 g

Certificate No. : 19-045373
Sample code : 19-15155-001

Page 2 of 3

REPORT OF CALIBRATION

Equipment : STANDARD WEIGHT 50 g
Manufacturer : METTLER TOLEDO
Class : F1
Serial No. : N/A
ID No. : LABE 10/1

Result of Calibration :

Conventional value of the result of weighing in air. For a weight taken at a reference temperature (t_{ref}) of 20 °C, the conventional mass is the mass of a reference weight of a density (ρ_{ref}) of 8000 kg.m⁻³ which it balances in air of a reference density (ρ_0) of 1.2 kg.m⁻³

Description	Deviation (mg)	Conventional Mass	Expanded Uncertainty (mg)	Maximum Permissible Error, OIML Class F1 \pm (mg)	ID No.
50 g	-0.317	49.999683 g	0.10	0.30	LABE 10/1

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3000

Page 1 of 3

Certificate No. : 19-045373
Sample code : 19-15155-001

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapiban 8 Rd., Nongkham,
Sriracha, Chonburi 20230
Location of calibration : Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.
(Calibration Laboratory)

Equipment : STANDARD WEIGHT 50 g

Manufacturer : METTLER TOLEDO

Class : F1

Serial No. : N/A

ID No. : LABE 10/1

Date of Receipt : 30 May 2019

Date of Calibration : 03 June 2019

Calibrated by : Approved by

Date of Issue : 06 June 2019

The uncertainties are for a confidence probability of approximately 95%

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)



Certificate No. : 19-045373

Page 3 of 3

Sample code : 19-15155-001

REPORT OF CALIBRATION

Condition of Calibration

1. Ambient Conditions : Temperature $20^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$, Relative humidity $50\% \pm 10\%$ and air density 1.19 kg/m^3
2. Calibration Method : Direct comparison weighing according to OIML R111-1 : 2004(E)
3. Description of Calibrated Item :

Type and Nominal Value : Standard Weight 50 g

Shape : Cylindrical weight with knob

Case : Wood Box

4. Reference Standard Instrument

Instrument	Class	ID. No.	Certificate No.	Due date
1. STANDARD WEIGHT 1 mg to 1 kg	E2	LB-WE-57	B634921863	11 August 2019

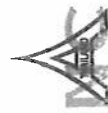
2. This certification is traceable to the International System of Unit maintained at : -

3. - Through the reference standard laboratory of Mettler-Toledo GmbH, 8606 Greifensee, Switzerland (Instrument number 1).

4. Condition of Calibration item : Normal

End of Report

STANDARD WEIGHT 100 g



Certificate No. : 19-045374

Sample code : 19-15155-002

Page 2 of 3

REPORT OF CALIBRATION

Equipment : STANDARD WEIGHT 100 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/2

Result of Calibration :

Conventional value of the result of weighing in air. For a weight taken at a reference temperature (t_m) of 20°C, the conventional mass is the mass of a reference weight of a density (ρ_m) of 8000 kg.m⁻³ which it balances in air of a reference density (ρ_o) of 1.2 kg.m⁻³

Description	Deviation (mg)	Conventional Mass	Expanded Uncertainty (mg)	ID No.
100 g	-0.24	99.99976 g	0.16	LABE 10/2

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS



Certificate No. : 19-045374

Sample code : 19-15155-002

Page 1 of 3

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.

683 Moo 11, Sukhapiban 8 Rd., Nongkham,

Sriracha, Chonburi 20230

Location of calibration : Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.
(Calibration Laboratory)

Equipment : STANDARD WEIGHT 100 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/2

Date of Receipt : 30 May 2019

Date of Calibration : 03 June 2019

Calibrated by : Approved by

Date of Issue : 06 June 2019

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)



Certificate No. : 19-045374

Page 3 of 3

Sample code : 19-15155-002

REPORT OF CALIBRATION

Condition of Calibration

1. Ambient Conditions : Temperature $20^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$, Relative humidity $50\% \pm 10\%$ and air density 1.19 kg/m^3
2. Calibration Method : WI-CL-007 base on OIML R 111-1 : 2004(E)

3. Description of Calibrated Item :

Type and Nominal Value : Standard Weight 100 g

Shape : Cylindrical weight with knob

Case : Wood Box

4. Reference standard instrument

Instrument	Class	ID. No.	Certificate No.	Due date
1) STANDARD WEIGHT 1 mg to 1 kg	E2	LB-WE-57	B634921863	11 August 2019

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

- Through the reference standard laboratory of Mettler-Toledo GmbH, 8606 Greifensee, Switzerland (Instrument number 1).

6. Condition of Calibration item : Normal

End of Report

STANDARD WEIGHT 50 g



ASIA MEDICAL AND AGRICULTURAL LABORATORY
AND RESEARCH CENTER CO., LTD.

(Head Office) 361/1-4 Soi Ladprao 122, (Mahadithai 1), Ladprao Road, Phibphila, Wangthonglang,
Bangkok, Thailand 10310 Tel.(66) 2-934-2381-3 Fax.(66) 2-934-0661

http://www.amarc.co.th
Email: c@amarc.co.th



NSC-TS17023
CALIBRATION 0152

Supersede to Calibration Certificate No. 19-053921

Certificate No. : 19-053921/1

Sample code : 19-17930-002

Page 1 of 3

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapiban 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of calibration : Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.
(Calibration Laboratory)

Equipment : STANDARD WEIGHT 50 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/4

Date of Receipt : 25 June 2019

Date of Calibration : 06 July 2019

Calibrated by [Redacted] **Approved by** [Redacted]

Date of issue : 16 September 2019

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)



ASIA MEDICAL AND AGRICULTURAL LABORATORY
AND RESEARCH CENTER CO., LTD.

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Bangkok, Thailand 10310 Tel.(66) 2-934-2381-3 Fax.(66) 2-934-0661

http://www.amarc.co.th
Email: c@amarc.co.th



NSC-TS17023
CALIBRATION 0152

Supersede to Calibration Certificate No. 19-053921

Certificate No. : 19-053921/1

Sample code : 19-17930-002

Page 2 of 3

REPORT OF CALIBRATION

Equipment : STANDARD WEIGHT 50 g
Manufacturer : N/A
Class : N/A
Serial No. : N/A
ID No. : LABE 10/4

Result of Calibration : Without adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature (t_{ref}) of 20°C, the conventional mass is the mass of a reference weight of a density (ρ_{ref}) of 8000 kg.m⁻³ which it balances in air of a reference density (ρ_a) of 1.2 kg.m⁻³

Description	Deviation (mg)	Expanded Uncertainty (mg)		ID No.
		Conventional Mass	Expanded Uncertainty	
50 g	-0.060	#REF!	0.10	LABE 10/4

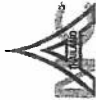
The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS N3000 [Redacted]



ASIA MEDICAL AND AGRICULTURAL LABORATORY
AND RESEARCH CENTER CO., LTD.

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<http://www.amarc.co.th>
Email: cl@amarc.co.th



NSC-IIR-TIS 17025
CALIBRATION 0152

Supersede to Calibration Certificate No. 19-053921

Certificate No. : 19-053921/1

Sample code : 19-17930-002

Page 3 of 3

REPORT OF CALIBRATION

Condition of Calibration

1. Ambient Conditions : Temperature $20^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$, Relative humidity $50\% \pm 10\%$ and air density 1.19 kg/m^3
2. Calibration Method : WI-CL-007 base on OIML R 111-1 : 2004(E)

3. Description of Calibrated Item :

Type and Nominal Value : Standard Weight 50 g

Shape : Cylindrical weight with knob

Case : Wood Box

4. Reference standard instrument

Instrument	Class	ID. No.	Certificate No.	Due date
1) STANDARD WEIGHT 1 mg to 1 kg	E2	LB-WE-57	B634921863	11 August 2019

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

- Through the reference standard laboratory of Mettler-Toledo GmbH, 8606 Greifensee, Switzerland (Instrument number 1).

6. Condition of Calibration Item : Normal

End of Report

THERMO-HYGROMETER

Model : 608-H1

Serial No. : 45106737

Certificate No. : 21-062722
Sample code : 21-24788-002

REPORT OF CALIBRATION

Results of calibration

Temperature measurement

Resolution of unit under calibration : 0.1 °C

Range : 0 °C to 50 °C

Calibration point °C	Average of standard reading		Unit under calibration		Expanded uncertainty °C
	Controlled humidity %RH	Temperature °C	Average reading °C	Correction value °C	
20	50	20.02	20.1	- 0.08	± 0.40
25	50	25.02	25.0	+ 0.02	± 0.40
30	50	30.00	29.7	+ 0.30	± 0.40

Humidity measurement

Resolution of unit under calibration : 0.1 %RH

Range : 10 %RH to 95 %RH

Calibration point %RH	Average of standard reading		Unit under calibration		Expanded uncertainty %RH
	Air temperature °C	Calculated humidity %RH	Average reading %RH	Correction value %RH	
45	25.00	45.13	52.4	- 7.27	± 1.3
60	25.00	60.03	67.5	- 7.47	± 1.5
75	25.00	75.20	82.5	- 7.30	± 1.7

Note

- Calibration results without adjustment

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2.00, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3

End of report

Certificate No. : 21-062722
Sample code : 21-24788-002

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO.,LTD

683 Moo 11, Sukhepiban 8 Rd, Nongkham,

Siracha, Chonburi 20230

Location of calibration : Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.

(Calibration laboratory)

Equipment : Digital thermo-hygrometer

Manufacturer : Testo Model : 608-H1

Serial No. : 45106737 ID No. : LABE 09/7

Date of receipt : 23 July 2021 Date of calibration : 29 July 2021

Condition of calibration

1 Environment Ambient temperature : 23.0 °C ± 3.0 °C

Relative humidity : 55.0 % ± 15.0 %

2 Calibration method

2.1 In-house method : WI-CL-045 By comparison with thermometer standard / chilled mirror hygrometer in controlled chamber.

2.2 The calibration by comparison unit under calibration (UUC) to the thermometer standard / chilled mirror hygrometer in controlled chamber in a chamber at the controlled temperature/ relative humidity.

3 Reference standard instrument

Instrument	Model	Code No.	Certificate No.	Due date
3.1 Chilled Mirror	Optidew Vision	LB-DP-02 & LB-DP-02 (DP)	TH-0018-21	10 March 2022
3.2 Digital Thermometer	Optidew Vision	LB-DP-02 & LB-DP-02 (Temp.)	21-032217	06 April 2022
3.3 Digital Thermometer	34972A	LB-DA-07 with RTD-89	20-085967	17 September 2021

4 This certificate is traceable to the international system of unit (SI Unit)

4.1 Instrument No.3.1 through : National Institute of Metrology (Thailand)

4.2 Instrument No.3.2 and 3.3 through : Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.

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

6 Condition of calibration item : Normal

Calibrated by

Approved by

Date of issue : 11 August 2021

The calibration result is applied only to the above calibrated item and was found accurate as shown on

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)

UV/VIS SPECTROPHOTOMETER

Model : UV – 1800

Serial No. : A11635101643CD



Bara Scientific Co., Ltd.
968 U Chu Liang Building Floor 7 Rama4 Road
Siam Bangkok Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375495-7
www.barascientific.com



Certificate of Calibration

Certificate No. BSCC-UV-152/21

Number of Page(s) 1 of 3

Equipment

Model

Manufacturer

Serial No.

ID No.

Date of receipt

Date of calibration

Date of issue

Customer name

Address

Temperature

Humidity

Equipment condition

Calibration Location

Calibration Procedure

Traceability

Calibrated by

UV/Vis Spectrophotometer

UV-1800

Shimadzu

A11635101643CD

LABEL 03/2

24 May 2021

24 May 2021

1 June 2021

Eastern Thai Consulting 1992 Co., Ltd.

683 Moo 11, Sukkaphibarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

(20.1-22.2) °C (On site)

(43.9-49.2) %RH (On site)

Good Operation

Analysis Department.

In-house method WI-UV-702-01 based on ASTM E275-01

Wavelength Accuracy is traceable to certificate No. 87839 and 87844

Photometric Accuracy is traceable to certificate No. 87846 and 87877

Stray Light is traceable to certificate No. 87825

The above certificate are traceable to SI unit through Stama Scientific Ltd.

(UKAS accredited calibration laboratory NO. 0659)



Bara Scientific Co., Ltd.
968 U Chu Liang Building Floor 7 Rama4 Road
Siam Bangkok Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375495-7
www.barascientific.com



Certificate of Calibration

Certificate No. BSCC-UV-152/21

Number of Page(s) 2 of 3

Calibration Results:

1. Wavelength Accuracy

Certified Wavelength (nm)	UUC (nm)	Error (nm)	Uncertainty (±nm)
287.71	287.70	-0.01	0.18
445.82	445.85	0.03	0.18
538.52	538.45	-0.07	0.18
741.02	741.05	0.03	0.18
879.41	879.35	-0.06	0.18

2. Photometric Accuracy (UV)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (±A)
235	0.0000	0.0000	0.0000	0.0075
257	0.7174	0.7178	0.0004	0.0075
313	CNR	CNR	CNR	CNR
350	CNR	CNR	CNR	CNR

*CNR = Customer not request

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate. Adversing the report / Certificate and publicity of the results are prohibited and also shall not be used except in full, without written approval of the Bara Scientific Co., Ltd.



Bara Scientific
 988 U Chu Liang Building Floor 7 Rama4 Road
 Silom Bangkok Bangkok Thailand 10500
 Tel : 02-6324300 Fax : 02-6375496-7
 www.barascientific.com



Certificate of Calibration

Certificate No. **BSCC-JV-152/21** Number of Page(s) **3 of 3**

Calibration Results:

3. Photometric Accuracy (Visible)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (±A)
420.0	0.0000 0.5631 0.7390 1.0863	0.0000 0.5615 0.7376 1.0846	0.0000 -0.0016 -0.0014 -0.0017	0.0042 0.0042 0.0042 0.0042
440.0	0.0000 0.5524 0.7217 1.0806	0.0000 0.5501 0.7199 1.0587	0.0000 -0.0023 -0.0018 -0.0019	0.0042 0.0042 0.0042 0.0042
465.0	CNR CNR CNR CNR	CNR CNR CNR CNR	CNR CNR CNR CNR	CNR CNR CNR CNR
546.1	0.0000 0.5147 0.6743 0.9909	0.0000 0.5124 0.6720 0.9892	0.0000 -0.0023 -0.0023 -0.0027	0.0042 0.0042 0.0042 0.0042
590.0	CNR CNR CNR CNR	CNR CNR CNR CNR	CNR CNR CNR CNR	CNR CNR CNR CNR
635.0	0.0000 0.5268 0.6720 0.9864	0.0000 0.5271 0.6708 0.9854	0.0000 0.0003 -0.0012 -0.0010	0.0042 0.0042 0.0042 0.0042

CNR = Customer not request

4. Stray Light*

Standard cut-off wavelength (nm)	Wavelength (nm)	Unit Under Calibration(UUC) Transmission (%T)	Absorbance (A)
200.86±0.11nm	201.05	0.9723	2.0123

The Stray light transmission reference is less than 1.0%T and Stray light absorbance reference is greater than 2.00A
 *Stray Light not NSC-ONSC Accredited.

The measurement uncertainty is base on a standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95%.

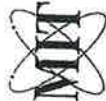
End of Certificate

The above results are valid exclusively for the calibrated item(s) as mention in the Advertising the report / Certificate and publicity of the results are prohibited and also except in full, without written approval of the Bara Scientific Co.,

Area Heat Stress Monitor

Model : QUESTemp 32

Serial No. : TPH060001



MIRACLE INTERNATIONAL TECHNOLOGY CO., LTD
214 Bangwaek Rd. Bangpai Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Certificate No.: AD2105-181-0001
Date Issued: 24-May-21

Customer
: Eastern Thai Consulting 1992 Co., Ltd.
683 Moo 11 Sukhapibam 8 Rd., Nongkham, Sriracha, Chonburi 20230

Equipment
: Area Heat Stress Monitor

Manufacturer
Model
: TSF
: QUESTemp 32
Serial No.
: TTPH060001
ID No./Tag No.
: --

Date Received
: 18-May-21
Date Calibrated
: 19-May-21

Calibrated by
: [REDACTED]

Calibration Method or Calibration Procedure Used

In-house method : CP-19 by comparing against Standard Digital Humidity / Temperature Meter

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Technical Manager, Miracle International Technology Company Limited.

Approved by



Page 1 of 2



Certificate No.: AD2105-181-0001

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

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

STD	UUC Reading ($^\circ\text{C}$)		UUC Error ($^\circ\text{C}$)	Measurement Uncertainty ($\pm^\circ\text{C}$)
	Reading ($^\circ\text{C}$)	Before Adjusted	After Adjusted	
38.01	WET	38.0	-	-0.01 0.35
38.01	DRY	37.9	-	-0.11 0.35
38.01	GLOBE	38.0	-	-0.01 0.35
45.01	WET	45.0	-	-0.01 0.35
45.01	DRY	44.9	-	-0.11 0.35
45.01	GLOBE	45.0	-	-0.01 0.35

STD = Standard

UUC = Unit Under Calibration

Description of UUC:
Range 0 to 100 $^\circ\text{C}$
Resolution 0.1 $^\circ\text{C}$

Measurement Standards Used & Traceability:

The International System of Units (SI) through

MIT Certificate No. AD2011-059-0001 for Digital Thermometer with Probe (Fluke) Serial No. 5856603, Due 13-Nov-21

End of Certificate

Page 2 of 2



Area Heat Stress Monitor

Model : QUESTemp 32

Serial No. : TPI050069



MIRACLE INTERNATIONAL TECHNOLOGY CO., LTD
214 Bangwaek Rd. Bangpai Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Certificate No. : AD2108-036-0001

Date Issued : 09-Aug-21

Customer : Eastern Thai Consulting 1992 Co., Ltd.
683 Moo 1.1 Sukhaphitbam 8 Rd., Nongkham, Sriracha, Chonburi 20230

Equipment : Area Heat Stress Monitor

Manufacturer : QUEST TECHNOLOGY

Model : QUESTEMP 32

Serial No. : TP1050069

ID No./Tag No. : -

Date Received : 03-Aug-21

Date Calibrated : 07-Aug-21

Calibrated by :

Calibration Method or Calibration Procedure Used

In-house method : CP-19 by comparing against Standard Digital Humidity / Temperature Meter

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Technical Manager, Miracle International Technology Company Limited.

Approved by :



Page 1 of 2

Certificate No. : AD2108-036-0001

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

STD Reading ($^\circ\text{C}$)	UUC Reading ($^\circ\text{C}$)		UUC Error ($^\circ\text{C}$)	Measurement Uncertainty ($\pm^\circ\text{C}$)
	Before Adjusted	After Adjusted		
38.00	WET 38.0	-	0.00	0.35
38.00	DRY 38.0	-	0.00	0.35
38.00	GLOBE 38.1	-	0.10	0.35
44.99	WET 45.0	-	0.01	0.35
44.99	DRY 45.0	-	0.01	0.35
44.99	GLOBE 45.1	-	0.11	0.35

STD = Standard

UUC = Unit Under Calibration

Description of UUC :
Range 0 to 100 $^\circ\text{C}$
Resolution 0.1 $^\circ\text{C}$

Measurement Standards Used & Traceability :
The International System of Units (SI) through

MIT Certificate No. AD2011-059-0001 for Digital Thermometer with Probe (Fluke) Serial No. 5856603, Due 13-Nov-21

End of Certificate

Page 2 of 2

Area Heat Stress Monitor

Model : QUESTemp 32

Serial No. : TPL060039



MIRACLE INTERNATIONAL TECHNOLOGY CO., LTD
214 Bangwaek Rd. Bangpai Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>

CALIBRATION CERTIFICATE

Certificate No. : AD2105-306-0001

Date Issued : 03-Jun-21

Customer : Eastern Thai Consulting 1992 Co., Ltd.
683 Moo 11 Sukhapibam 8 Rd., Nongkham, Sriracha, Chonburi 20230

Equipment : Area Heat Stress Monitor

Manufacturer : Quest Technologies
Model : QUESTemp 32
Serial No. : TPL060039
ID No./Tag No. : 4
Date Received : 31-May-21
Date Calibrated : 02-Jun-21

Calibrated by

Calibration Method or Calibration Procedure Used

In-house method : CP-19 by comparing against Standard Digital Humidity / Temperature Meter

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

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Approved by :



Page 1 of 2

Certificate No. : AD2105-306-0001

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

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

STD	Reading ($^\circ\text{C}$)	UUC Reading ($^\circ\text{C}$)	Before Adjusted	After Adjusted	UUC Error ($^\circ\text{C}$)	Measurement Uncertainty ($\pm ^\circ\text{C}$)
38.01	WET	38.0	-	-	-0.01	0.35
38.01	DRY	37.9	-	-	-0.11	0.35
38.01	GLOBE	37.9	-	-	-0.11	0.35
44.99	WET	45.0	-	-	0.01	0.35
44.99	DRY	45.0	-	-	0.01	0.35
44.99	GLOBE	45.0	-	-	0.01	0.35

STD = Standard

UUC = Unit Under Calibration

Description of UUC :

Range : 0 to 100 $^\circ\text{C}$
Resolution : 0.1 $^\circ\text{C}$

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. AD2011-059-0001 for Digital Thermometer with Probe (Fluke) Serial No. 5856603, Due 13-Nov-21

End of Certificate

Page 2 of 2

Area Heat Stress Monitor

Model : QUESTemp 32

Serial No. : TPL060040



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Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>

CALIBRATION CERTIFICATE

Certificate No. : AD2105-306-0002

Date Issued : 03-Jun-21

Customer : Eastern Thai Consulting 1992 Co., Ltd.
683 Moo 11 Sukhapibam 8 Rd., Nongkham, Sriracha, Chonburi 20230

Equipment : Area Heat Stress Monitor

Manufacturer : Quest Technologies

Model : QUESTemp 32

Serial No. : TPL060040

ID No./Tag No. : 5

Date Received : 31-May-21

Date Calibrated : 02-Jun-21

Calibrated by

Calibration Method or Calibration Procedure Used

In-house method : CP-19 by comparing against Standard Digital Humidity / Temperature Meter

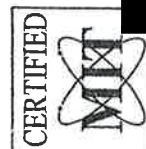
This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

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Approved by :



Page 1 of 2

Certificate No. : AD2105-306-0002

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

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

STD	UUC Reading ($^\circ\text{C}$)		UUC Error ($^\circ\text{C}$)	Measurement Uncertainty ($^\circ\text{C}$)
	Reading ($^\circ\text{C}$)	Before Adjusted After Adjusted		
38.01	WET	38.1	0.09	0.35
38.01	DRY	38.0	-0.01	0.35
38.01	GLOBE	37.9	-0.11	0.35
44.99	WET	44.9	-0.09	0.35
44.99	DRY	45.0	0.01	0.35
44.99	GLOBE	44.9	-0.09	0.35

STD = Standard

UUC = Unit Under Calibration

Description of UUC :
Range 0 to 100 $^\circ\text{C}$
Resolution 0.1 $^\circ\text{C}$

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. AD2011-059-0001 for Digital Thermometer with Probe (Fluke) Serial No. 5856603, Due 13-Nov-21

End of Certificate

Page 2 of 2

Area Heat Stress Monitor

Model : QUESTemp 32

Serial No. : TPQ030023



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Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Certificate No. : AD2202-233-0002

Date Issued : 23-Feb-22

Customer : Eastern Thai Consulting 1992 Co., Ltd.
683 Moo 11 Sukhapibam 8 Rd., Nongkham, Sriracha, Chonburi 20230

Equipment : Area Heat Stress Monitor

Manufacturer : Quest Technology

Model : QUESTemp 32

Serial No. : TPQ030023

ID No./Tag No. : 8

Date Received : 18-Feb-22

Date Calibrated : 21-Feb-22

Calibrated by :

Calibration Method or Calibration Procedure Used

In-house method : CP-19 by comparing against Standard Digital Humidity / Temperature Meter

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

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Approved by :



Page 1 of 2

Certificate No. : AD2202-233-0002

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

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

STD	UUC Reading ($^\circ\text{C}$)		UUC Error ($^\circ\text{C}$)	Measurement Uncertainty ($\pm ^\circ\text{C}$)
	Reading ($^\circ\text{C}$)	Before Adjusted After Adjusted		
38.00	38.00	WET 38.1	-	0.10
		DRY 38.1	-	0.10
		GLOBE 38.1	-	0.10
44.98	44.98	WET 44.9	-	0.08
		DRY 44.9	-	0.08
		GLOBE 44.9	-	0.08

STD = Standard

UUC = Unit Under Calibration

Description of UUC : Range 0 to 100 $^\circ\text{C}$
Resolution 0.1 $^\circ\text{C}$

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. AD2111-077-0001 for Digital Thermometer with Probe (Fluke) Serial No. 5856603, Due 11-Nov-22

End of Certificate

Page 2 of 2

Area Heat Stress Monitor

Model : QUESTemp 32

Serial No. : TPL090016



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Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Certificate No. : AD2109-161-0001
Date Issued : 21-Sep-21

Customer : Eastern Thai Consulting 1992 Co., Ltd.
683 Moo 11 Sukhapibarn 8 Rd., Nongkham, Siiraacha, Chonburi 20230

Equipment : Area Heat Stress Monitor

Manufacturer : QUEST TECHNOLOGIES

Model : QUESTemp 32

Serial No. : TPL090016

ID No./Tag No. : NO.6

Date Received : 14-Sep-21

Date Calibrated : 18-Sep-21

Calibrated by : [REDACTED]

Calibration Method or Calibration Procedure Used

In-house method : CP-19 by comparing against Standard Digital Humidity / Temperature Meter

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

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Approved by



Page 1 of 2

Certificate No. : AD2109-161-0001

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

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

STD	UUC Reading ($^\circ\text{C}$)		UUC Error ($^\circ\text{C}$)	Measurement Uncertainty ($\pm ^\circ\text{C}$)
	Reading ($^\circ\text{C}$)	Before Adjusted After Adjusted		
38.00	WET	38.1	0.10	0.35
38.00	DRY	37.9	-0.10	0.35
38.00	GLOBE	37.9	-0.10	0.35
45.00	WET	45.0	0.00	0.35
45.00	DRY	44.8	-0.20	0.35
45.00	GLOBE	45.1	0.10	0.35

STD = Standard

UUC = Unit Under Calibration

Description of UUC :
Range 0 to 100 $^\circ\text{C}$
Resolution 0.1 $^\circ\text{C}$

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. AD2011-059-0001 for Digital Thermometer with Probe (Fluke) Serial No. 5856603, Due 13-Nov-21

End of Certificate

Page 2 of 2



Area Heat Stress Monitor

Model : QUESTemp 34

Serial No. : TEU080011



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214 Bangwaek Rd. Bangpai Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Certificate No. : AD2108-174-0002

Date Issued : 20-Aug-21

Customer : Eastern Thai Consulting 1992 Co., Ltd.
683 Moo 11 Sukhapibam 8 Rd., Nongkham, Sriracha, Chonburi 20230

Equipment : Area Heat Stress Monitor

Manufacturer : TSI

Model : QUESTemp34

Serial No. : TEU080011

ID No./Tag No. : 10

Date Received : 17-Aug-21

Date Calibrated : 19-Aug-21

Calibrated by : [REDACTED]

Calibration Method or Calibration Procedure Used

In-house method : CP-19 by comparing against Standard Digital Humidity / Temperature Meter

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

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Approved by :



Page 1 of 2

Certificate No. : AD2108-174-0002

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

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

STD Reading ($^\circ\text{C}$)	UUC Reading ($^\circ\text{C}$)		UUC Error ($^\circ\text{C}$)	Measurement Uncertainty ($\pm^\circ\text{C}$)
	Before Adjusted	After Adjusted		
38.00	WET 38.0	-	0.00	0.35
38.00	DRY 37.9	-	-0.10	0.35
38.00	GLOBE 38.0	-	0.00	0.35
44.99	WET 45.0	-	0.01	0.35
44.99	DRY 44.9	-	-0.09	0.35
44.99	GLOBE 44.9	-	-0.09	0.35

STD = Standard

UUC = Unit Under Calibration

Description of UUC : Range $(-5) \text{ to } 100 ^\circ\text{C}$
Resolution $0.1 ^\circ\text{C}$

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. AD2011-059-0001 for Digital Thermometer with Probe (Fluke) Serial No. 5856603, Due 13-Nov-21

End of Certificate

Page 2 of 2

Area Heat Stress Monitor

Model : QUESTemp 34

Serial No. : TEU080012



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214 Bangwaek Rd. Bangpai Bangkoe Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Certificate No. : AD2108-174-0004

Date Issued : 20-Aug-21

Customer : Eastern Thai Consulting 1992 Co., Ltd.
683 Moo 11 Sukhapibam 8 Rd., Nongkham, Sriracha, Chonburi 20230

Equipment : Area Heat Stress Monitor

Manufacturer : TSI

Model : QUESTemp34

Serial No. : TEU080012

ID No./Tag No. : 15

Date Received : 17-Aug-21

Date Calibrated : 19-Aug-21

Calibrated by : [REDACTED]

Calibration Method or Calibration Procedure Used

In-house method : CP-19 by comparing against Standard Digital Humidity / Temperature Meter

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

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Approved by :



Page 1 of 2

Certificate No. : AD2108-174-0004

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

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

STD	UUC Reading ($^\circ\text{C}$)		UUC Error ($^\circ\text{C}$)		Measurement Uncertainty ($\pm^\circ\text{C}$)
	Reading ($^\circ\text{C}$)	Before Adjusted	After Adjusted		
38.00	WET	37.9	-	-0.10	0.35
38.00	DRY	37.9	-	-0.10	0.35
38.00	GLOBE	38.0	-	0.00	0.35
44.99	WET	44.9	-	-0.09	0.35
44.99	DRY	44.9	-	-0.09	0.35
44.99	GLOBE	45.1	-	0.11	0.35

STD = Standard

UUC = Unit Under Calibration

Description of UUC : Range $(-5) \text{ to } 100^\circ\text{C}$
Resolution 0.1°C

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. AD2011-059-0001 for Digital Thermometer with Probe (Fluke) Serial No. 5856603, Due 13-Nov-21

End of Certificate

Page 2 of 2

Area Heat Stress Monitor

Model : QUESTemp 34

Serial No. : TEU080014



MIRACLE INTERNATIONAL TECHNOLOGY CO., LTD
214 Bangwaek Rd. Bangpai Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Certificate No. : AD2108-174-0001
Date Issued : 20-Aug-21

Customer : Eastern Thai Consulting 1992 Co., Ltd.
683 Moo 11 Sukhapiarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

Equipment : Area Heat Stress Monitor

Manufacturer : TSI

Model : QUESTemp34

Serial No. : TEU080014

ID No./Tag No. : 13

Date Received : 17-Aug-21

Date Calibrated : 19-Aug-21

Calibrated by :

Calibration Method or Calibration Procedure Used

In-house method : CP-19 by comparing against Standard Digital Humidity / Temperature Meter

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Technical Manager, Miracle International Technology Company Limited.

Approved by :



Page 1 of 2

Certificate No. : AD2108-174-0001

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

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

STD Reading ($^\circ\text{C}$)	UUC Reading ($^\circ\text{C}$)		UUC Error ($^\circ\text{C}$)	Measurement Uncertainty ($\pm^\circ\text{C}$)
	Before Adjusted	After Adjusted		
38.00	WET 38.1	-	0.10	0.35
38.00	DRY 38.1	-	0.10	0.35
38.00	GLOBE 37.9	-	-0.10	0.35
44.99	WET 45.0	-	0.01	0.35
44.99	DRY 45.0	-	0.01	0.35
44.99	GLOBE 44.9	-	-0.09	0.35

STD = Standard

UUC = Unit Under Calibration

Description of UUC :
Range (-5) to 100 $^\circ\text{C}$
Resolution 0.1 $^\circ\text{C}$

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. AD2011-059-0001 for Digital Thermometer with Probe (Fluke) Serial No. 5856603, Due 13-Nov-21

End of Certificate

Page 2 of 2

ANALYTICAL BALANCE (DU)

Model : XS205 DU

Serial No. : 1126323724

Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5 Lualaba Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10260
+66 2723 0382
MT-TH.ServiceSupport@mt.com



Accuracy Calibration Certificate

Customer

Company: EASTERN THAI CONSULTING 1992 CO., LTD.
Address: 683 Moo 11, Sukhaphiban 8 Rd., Nong Kham
City: Sriracha
Zip / Postal: 20230
State / Province: Chonburi
Order Number: 0332116644

Contact: [REDACTED]

Weighing Device

Manufacturer: Mettler Toledo
Model: XS205DU
Serial No.: 1126323724
Building: Laboratory
Floor: 1
Room: Laboratory
Instrument Type: Weighing Instrument
Asset Number: LABE 05/1
Terminal Model: SAT
Terminal Serial No.: 1126323724
Terminal Asset No.: N/A

Range	Max Capacity	Readability (d)
1	81 g	0.00001 g
2	220 g	0.0001 g

Procedure

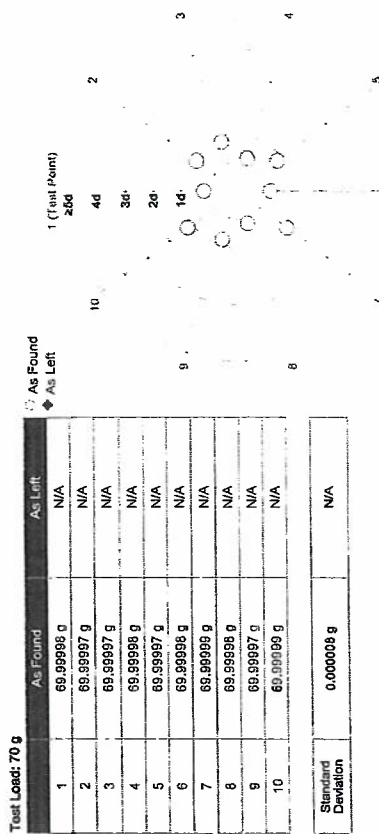
Calibration Guideline: EURAMET op-18 v. 4.0 (11/2015)
CPI/M020220
METTLER TOLEDO Work Instruction:
This calibration certificate contains measurements for As Found calibration. No As Left calibration was performed because the device was not modified after As Found calibration. Therefore, results for As Left correspond to As Found.
The sensitivity/span of the weighing instrument was adjusted before calibration with a built-in weight.
In accordance with EURAMET op-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

As Found	Temperature	Humidity
	Start: 26.9 °C End: 26.8 °C	Start: 73.8 % End: 71.9 %

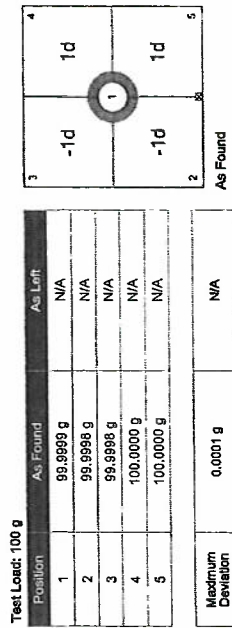
As Found Calibration Date: 22-Jul-2021
As Left Calibration Date: N/A
Issue Date: 23-Jul-2021
Approved Signatory: [REDACTED]

Measurement Results

Repeatability



Eccentricity

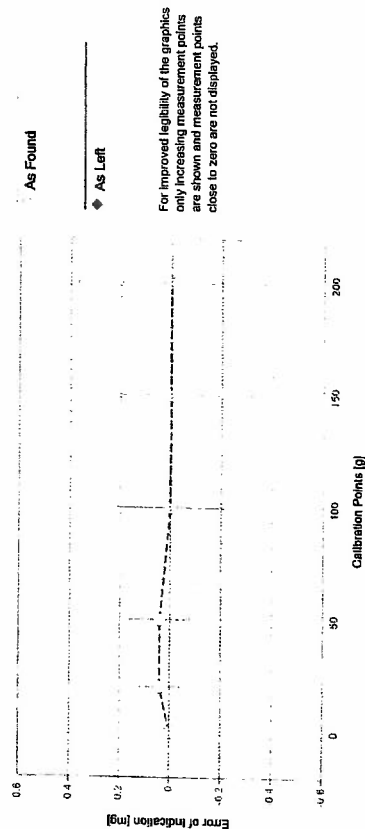


Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.00000 g	0.00000 g	0.00000 g	0.017 mg	2
2	0.01000 g	0.01000 g	0.00000 g	0.019 mg	2
3	0.10000 g	0.09999 g	-0.00001 g	0.023 mg	2
4	1.00000 g	1.00000 g	0.00000 g	0.032 mg	2
5	4.99999 g	5.00000 g	0.00002 g	0.048 mg	2
6	9.99999 g	10.00001 g	0.00002 g	0.061 mg	2
7	20.00001 g	20.00005 g	0.00004 g	0.082 mg	2
8	49.99993 g	49.99997 g	0.00004 g	0.12 mg	2
9	99.9999 g	99.9999 g	0.0000 g	0.21 mg	2
10	149.9998 g	149.9998 g	0.0000 g	0.32 mg	2
11	199.9998 g	199.9998 g	0.0000 g	0.37 mg	2

The calculated uncertainty was replaced by the CMC (Calibration and Measurement Capabilities) value because the calculated uncertainty was smaller than the CMC value.



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor $k = 2$ which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML E2

Weight Set No.:	WS28	Date of Issue:	17-Nov-2020
Certificate Number:	170241	Calibration Due Date:	15-May-2022

Thermo Hygrometer

Equipment No.:	IN51	Date of Issue:	02-Mar-2021
Certificate Number:	21H403	Calibration Due Date:	23-Feb-2022

Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with $k=2$ in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: $1.5 \cdot 10^{-4} / K$
Temperature range on site for the evaluation of the measurement uncertainty in use: 5 K

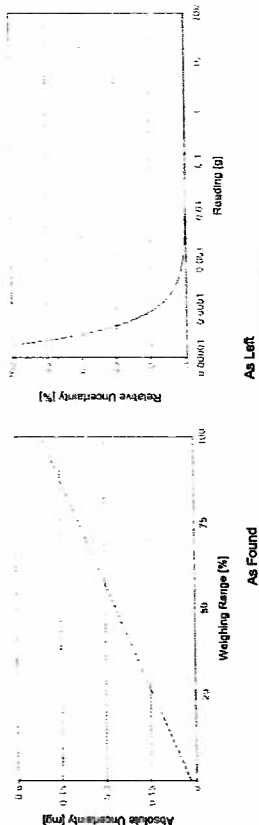
Linearization of Uncertainty Equation

Range	As Found		As Left
	d	Max	
1	0.00001 g	81 g	$U_1 = 0.018 \text{ mg} + 0.00603 \text{ mg/g} \cdot R$ N/A
2	0.00001 g	220 g	$U_2 = 0.08 \text{ mg} + 0.00603 \text{ mg/g} \cdot R$ N/A

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Example)

Net Indication		As Found		As Left	
0.00220 g		0.018 mg	0.82%	N/A	N/A
0.02200 g		0.018 mg	0.082%	N/A	N/A
0.22000 g		0.019 mg	0.0088%	N/A	N/A
2.20000 g		0.031 mg	0.014%	N/A	N/A
220.0000 g		1.4 mg	0.0063%	N/A	N/A



The weighing range shown in the absolute uncertainty graph refers to the first interval/range of the device.

GWP® Certificate



AS Found ✓ AS Left ✓

The weighing device meets the given process requirements.

The weighing device meets the given process requirements.

Tests Performed:

☒ As Found ☐ As Left ☐ No adjustments/modifications made. As Left results correspond to As Found.

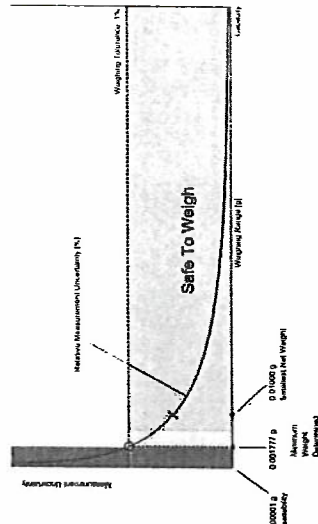
Process Requirements

Weighing Tolerance: 1%

Smallest Net Weight: 0.01000 g

Safety Factor: 2

Safe Weighing Range



While the values in this graph reflect the actual calibration results, the measurement uncertainty curves are simply a visual representation. This graph reflects As Left testing, unless only As Found was performed.

Minimum Weight

As Found Minimum Weight Table

Range 1

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.017873 g	0.035985 g	0.054282 g	0.091605 g	0.189140 g
0.2%	0.008909 g	0.017873 g	0.026891 g	0.045095 g	0.091605 g
0.5%	0.003557 g	0.007113 g	0.010697 g	0.017873 g	0.035985 g
1%	0.001777 g	0.003557 g	0.005339 g	0.008909 g	0.017873 g
2%	0.000888 g	0.001777 g	0.002667 g	0.004448 g	0.008909 g
5%	0.000355 g	0.000711 g	0.001066 g	0.001777 g	0.003557 g

The minimum weight table applies to the fine range of the weighing device.

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

As Left Minimum Weight Table

Range 1

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.017873 g	0.035985 g	0.054282 g	0.091605 g	0.189140 g
0.2%	0.008909 g	0.017873 g	0.026891 g	0.045095 g	0.091605 g
0.5%	0.003557 g	0.007113 g	0.010697 g	0.017873 g	0.035985 g
1%	0.001777 g	0.003557 g	0.005339 g	0.008909 g	0.017873 g
2%	0.000888 g	0.001777 g	0.002667 g	0.004448 g	0.008909 g
5%	0.000355 g	0.000711 g	0.001066 g	0.001777 g	0.003557 g

The minimum weight table applies to the fine range of the weighing device.

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1/1 (no safety factor), 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with $k = 2$ and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

Measurement Results

Results Summary

Repeatability		Eccentricity		Error of Indication	
As Found	As Left	As Found	As Left	As Found	As Left
✓	✓	✓	✓	✓	✓

✓ = Passed
✗ = Failed
A = Safety Factor not met

Repeatability

Test Load: 70 g

Tolerance		Control Limit		As Found		As Left	
				Std. Deviation	Result	Std. Deviation	Result
0.1%	0.000005 g	0.000005 g	✓	0.000008 g	✓	0.000008 g	✓
0.2%	0.000010 g	0.000010 g	✓				
0.5%	0.000025 g	0.000025 g	✓				
1%	0.000050 g	0.000050 g	✓				
2%	0.000100 g	0.000100 g	✓				
5%	0.000250 g	0.000250 g	✓				

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

Eccentricity

Test Load: 100 g

Tolerance		Control Limit		As Found		As Left	
				Std. Deviation	Result	Std. Deviation	Result
0.1%	0.000005 g	0.000005 g	✓	0.00001 g	✓	0.00001 g	✓
0.2%	0.000010 g	0.000010 g	✓				
0.5%	0.000025 g	0.000025 g	✓				
1%	0.000050 g	0.000050 g	✓				
2%	0.000100 g	0.000100 g	✓				
5%	0.000250 g	0.000250 g	✓				

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

As Found

Control limits for various weighing tolerances									
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%		
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A	✓	✓
20.00001 g	0.00004 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g	✓	✓
49.99993 g	0.00004 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g	✓	✓
99.99990 g	0.00000 g	0.05000 g	0.10000 g	0.25000 g	0.50000 g	1.00000 g	2.50000 g	✓	✓
149.99998 g	0.00000 g	0.07500 g	0.15000 g	0.37500 g	0.75000 g	1.50000 g	3.75000 g	✓	✓
199.99998 g	0.00000 g	0.10000 g	0.20000 g	0.50000 g	1.00000 g	2.00000 g	5.00000 g	✓	✓
Result		✓	✓	✓	✓	✓	✓	✓	✓

As Left

Control limits for various weighing tolerances									
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%		
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A	✓	✓
20.00001 g	0.00004 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g	✓	✓
49.99993 g	0.00004 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g	✓	✓
99.99990 g	0.00000 g	0.05000 g	0.10000 g	0.25000 g	0.50000 g	1.00000 g	2.50000 g	✓	✓
149.99998 g	0.00000 g	0.07500 g	0.15000 g	0.37500 g	0.75000 g	1.50000 g	3.75000 g	✓	✓
199.99998 g	0.00000 g	0.10000 g	0.20000 g	0.50000 g	1.00000 g	2.00000 g	5.00000 g	✓	✓
Result		✓	✓	✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.

Service Date: 2021-07-22
Document Number: TH2046-052-072221-LABBalanceHR
EASTERN TIAH CONSULTING 1992 CO. LTD.
683 Moo 11, Sukhaphiban 8 Rd., Nong Khem, Sriracha, Chonburi 20230
Saiporn Nakin

Balance Health Report

Device Details		System Details	
Manufacturer:	Mettler Toledo	Accessory 1:	
Model:	XS205DU	Accessory 2:	
Serial number:	1128232724	Weight set for routine testing:	Yes /
Pinweight:	4.00 / 5.61		
Device History		Service History	
Instrument in use:	Yes	Last preventive maintenance:	< 1 year
Instrument age:	> 10 years	Last instrument calibration:	< 1 year
Spare parts available:	Yes	Last minimum weight determination:	Never
Regulations:	ISO		
Process tolerance in %:	1%	Routine testing performed:	Yes
Smallest sample net weight:	0.01000 g		
Check List			
Environmental Conditions		General & Functional Checks	
Room temperature fluctuation	✓	Leveling	✓
Exposure to direct sun	✓	Cleanliness	✓
Vibrations	✓	Completeness - missing parts see additional remarks	✓
Draft	✓	Settings optimized for operating environment	✓
Dirt or dust	✓	Other - objections noted as additional remarks	✓
Static	✓	Electrical Component Checks	
Mechanical Component Checks		Power supply	✓
Dent shield	✓	Sliding door drive	✓
Weighting pan position	✓	Internal weight drive	✓
Housing	✓	Display	✓
Other - objections noted as additional remarks	✓	Other - objections noted as additional remarks	✓
Recommendations			
Measurement Result Quality		Process Efficiency	
Instrument calibration	Uninstall instrument		
Identify safe weighing range	✓	Replace instrument	
GWP verification / risk assessment	Yes	Replace / add parts (see additional remarks)	
Preventive maintenance		Onsite repair	
Perform routine testing with test weights		Depth repair	
User training		Use of accessories (see additional remarks)	
Contact Name:	Saiporn Nakin	Position:	
Phone:	0960513303	Email:	dc_le@mettler.com
Additional Remarks & Recommendations			
Engineer Details			
Date: 22-Jul-2021			

This is not a certificate.

It should not be used to interpret final results for the testing of these devices.

Legend: ✓ Good/Pass ✗ Bad/Fail ⚠ Needs Attention ❌ Not Applicable

BAROMETER

Equipment : Analog Barometer

ID No. / Tag No. : BM001/41



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD
214 Bangwaek Rd. Bangpai Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Certificate No. : AD2106-032-0001

Date Issued : 04-Jun-21

Customer : Eastern Thai Consulting 1992 Co., Ltd.
683 Moo 11 Sukhapibum 8 Rd., Nongkham, Sriracha, Chonburi 20230

Equipment : Analog Barometer

Manufacturer : Barigo
Model : -
Serial No. : -
ID No./Tag No. : BM001/41
Date Received : 02-Jun-21
Date Calibrated : 04-Jun-21

Calibrated by : [REDACTED]

Calibration Method or Calibration Procedure Used

In-house method : CP-21 base on DKD-R 6-1: Edition 3 2014.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Technical Manager, Miracle International Technology Company Limited.

Approved by :



Page 1 of 2



Certificate No. : AD2106-032-0001

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

STD Reading hPa	UUC Reading (hPa) Before Adjusted	UUC Reading (hPa) After Adjusted	UUC Error hPa	Uncertainty \pm hPa
990.00	990.0	-	0.00	0.91
1000.00	1000.0	-	0.00	0.91
1010.00	1010.0	-	0.00	0.91
1020.00	1020.0	-	0.00	0.91
1030.00	1030.0	-	0.00	0.91

STD = Standard

UUC = Unit Under Calibration

Calibrated condition :

Pressure Medium : Air : Density = 1.19 kg/m^3 @ 20°C , 1 bar
Mounting Position : Vertical
Reference Level : at center of its dial

Description of UUC :

Range : 955 - 1075 hPa Absolute
Calibration Range : 990 - 1030 hPa Absolute
Scale Interval : 1 hPa
Resolution : 0.5 hPa Absolute

Measurement Standards Used & Traceability :

The International System of Units (SI) through

IRPC Certificate No. CL1-P210029 for Digital Barometer Serial No. 290185, Due 19-Oct-21

End of Certificate

Page 2 of 2



Hot Air Oven

Model : UFE 500

Serial No. : G511.0182



CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapiban 8 Rd., Nongkham,
Siracha, Chonburi 20230
Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Laboratory)
Equipment : Temperature controlled enclosures (Hot air oven)
Manufacturer : Memmert
Serial No. : G511.0182
Date of Receipt : 03 February 2022
Condition of Calibration
1. Environment : Maximum 27.5 °C ; Minimum 26.4 °C
1.2 Relative humidity : Maximum 59.5 % ; Minimum 50.8 %
1.3 Line voltage supplied : Maximum 225.1 VAC ; Minimum 223.2 VAC
2. Calibration method
2.1 TLAS-G-20: Guidelines for calibration and checks of temperature controlled enclosures.
3. Reference standard instrument
Instrument ID No. Certificate No. Due Date
Data Acquisition With Sensor LB-DA-11 (RTD-148 to RTD-155, RTD-227) 21-041213 09 May 2022
(RTD-P100)
4. This certificate is traceable to the international system of unit (SI Unit).
The measurement is traceable to Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.
5. This result of calibration was found accurate as shown on date and place of calibration only.
6. Condition of calibration item : Normal

Page 1 of 3
Certificate No. : 22-011766
Sample Code : 22-04498-003

Customer

: EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapiban 8 Rd., Nongkham,
Siracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Laboratory)

Equipment : Temperature controlled enclosures (Hot air oven)
Manufacturer : Memmert
Serial No. : G511.0182
Date of Receipt : 03 February 2022
Condition of Calibration

1. Environment : Maximum 27.5 °C ; Minimum 26.4 °C
1.2 Relative humidity : Maximum 59.5 % ; Minimum 50.8 %
1.3 Line voltage supplied : Maximum 225.1 VAC ; Minimum 223.2 VAC

2. Calibration method

2.1 TLAS-G-20: Guidelines for calibration and checks of temperature controlled enclosures.

3. Reference standard instrument

Instrument	ID No.	Certificate No.	Due Date
Data Acquisition With Sensor (RTD-P100)	LB-DA-11 (RTD-148 to RTD-155, RTD-227)	21-041213	09 May 2022

4. This certificate is traceable to the international system of unit (SI Unit).

The measurement is traceable to Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.

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

6. Condition of calibration item : Normal

Calibrated by

Approved by

Issue date

11 February 2022

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Center (TLAS) which has been approved by the Ministry of Commerce of Thailand. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

361 Sol Ladprao 122, Ladprao Road,
Phlabphla, Wang Thonglang, Bangkok 10310
RM-CL-114
TEL 02-516-2422
FAX 02-516-6949
Rev.01
CONTACT@AMARC.CO.TH
WWW.AMARC.CO.TH
Effective Date: 15/10/21



REPORT OF CALIBRATION

Page 2 of 3
Certificate No. : 22-011766
Sample Code : 22-04498-003

Results of Calibration

Resolution : 0.5 °C

1. Reporting of Temperature

Calibration point (°C)	UUC* setting (°C)	UUC* reading (°C)	Measured temperature at each positions (°C)								Uncertainty ± (°C)	Coverage factor k	
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8			# 9 ^{ref}
104	103.5	103.5	104.46	104.45	#####	104.07	104.46	104.42	104.34	104.07	104.30	0.53	2.00

2. Characterization results

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
104	0.12	0.80	1.13

Notes

* UUC* = Unit Under Calibration

361 Sol Ladprao 122, Ladprao Road,
Phlabphla, Wang Thonglang, Bangkok 10310
RM-CL-018
TEL 02-516-2422
FAX 02-516-6949
Rev.09
CONTACT@AMARC.CO.TH
WWW.AMARC.CO.TH
Effective Date: 15/10/21

REPORT OF CALIBRATION

Certificate No. : 22-011766

Sample Code : 22-04498-003

Results of Calibration

Notes

1. Sensor installation locations
 - 1.1 All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
 - 1.2 The reference sensor is preferably located of the geometric center of the chamber.
2. Interior dimensions approx of chamber :
W = 56 cm ; D = 40 cm ; H = 48 cm
3. Air valve or fresh air level : Off
4. Fan level : Open

5. The quoted uncertainty includes* Stability of chamber and loading effect

in chamber at 20% of uniformity *.

6. 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.

7. Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

8. Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.

9. UUC* reading - the average reading of indicating device that forms the integral part of the enclosure.

10. Calibration results without adjustment.

The result expanded uncertainty of measurement U is stated as the standard uncertainty multiplied by the coverage factor k , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

- End of Report -

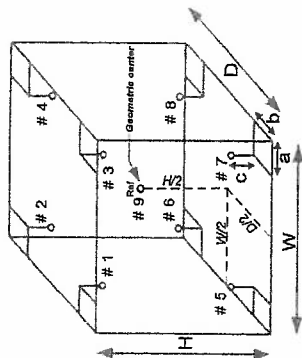


Figure: Example of sensor
installation Positions



Primary Flow Calibrator

Serial No. : 110619

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

CERTIFICATE OF ANALYSIS

EPA PROTOCOL GAS

Cylinder No. : EB0062815

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E04N199E15ACX9C Reference Number: 82-401135335-1
Cylinder Number: EB0062815 Cylinder Volume: 144.4 CF
Laboratory: 124 - Riverton (SAP) - NJ Cylinder Pressure: 2015 PSIG
PGVP Number: B52018 Valve Outlet: 660
Gas Code: CO,NO,NOX,SO2,BALN Certification Date: Mar 13, 2018
Expiration Date: Mar 13, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/031, 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 volumetric volume 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
NOX	50.00 PPM	50.55 PPM	G1	+/- 1.4% NIST Traceable
NITRIC OXIDE	50.00 PPM	50.50 PPM	G1	+/- 1.4% NIST Traceable
SULFUR DIOXIDE	50.00 PPM	51.01 PPM	G1	+/- 1.0% NIST Traceable
CARBON MONOXIDE	2000 PPM	1977 PPM	G1	+/- 1.0% NIST Traceable
NITROGEN	Balance			03/06/2018

CALIBRATION STANDARDS			
Type	Lot ID	Cylinder No	Concentration
NTRM	16060607	CC442564	50.42 PPM NITRIC OXIDE/NITROGEN
PRM	12367	APEX1099237	9.82 PPM NITROGEN DIOXIDE/AIR
DMIS	0315201604	CC503358	4.975 PPM NITROGEN DIOXIDE/NITROGEN
NTRM	16011025	CC473218	49.02 PPM SULFUR DIOXIDE/NITROGEN
NTRM	12060735	CC355192	2488 PPM CARBON MONOXIDE/NITROGEN
The SRM, PRM or RGM noted above is only in reference to the GMS used in the assay and not part of the analysis.			

ANALYTICAL EQUIPMENT			
Instrument/Make/Model		Analytical Principle	Last Multipoint Calibration
Nicolet 8700 APW1100391 CO		FTIR	Feb 08, 2018
Nicolet 8700 APW1100391 NO		FTIR	Feb 16, 2018
Nicolet 8700 APW1100391 NO2		FTIR	Feb 16, 2018
Nicolet 8700 APW1100391 SO2		FTIR	Mar 01, 2018

Triad Data Available Upon Request

NOTES: NET WEIGHT: 10.43lbs
GROSS WEIGHT: 60.93lbs
PO# 5218000763

This calibration std. has been certified in accordance with the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/031. All testing processes and measurements conform to the requirements of ISO/IEC 17025 and to Airgas ISO 9001:2000 and relate only to items identified on this certificate. All samples are certified to be NIST Traceable with total uncertainty as detailed under Analytical Uncertainty. This document shall not be reproduced in full without written approval of the issuer.



TESTING CERT No. 3082.05

ANALYTICAL BALANCE (DU)

Model : XS205 DU

Serial No. : 1126323724



Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5 Lasalle Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10260
+66 2723 0382
MT-TH.ServicesSupport@mt.com

Accuracy Calibration Certificate

Customer

Company: EASTERN THAI CONSULTING 1992 CO., LTD.
Address: 683 Moo 11, Sukhaphiban 8 Rd., Nong Kham
City: [REDACTED]
Contact: [REDACTED]
Zip / Postal: 20230
State / Province: Chonburi
Order Number: [REDACTED]

Weighing Device

Manufacturer: Mettler Toledo
Model: XS205DU
Serial No.: 1126323724
Building: Laboratory
Floor: 1
Room: Laboratory
Weighing Instrument: LABE 05/1
SAT
Terminal Model: 1126323724
Terminal Serial No.: N/A
Terminal Asset No.: N/A

Range	Max Capacity	Readability (d)
1	81 g	0.00001 g
2	220 g	0.0001 g

Procedure

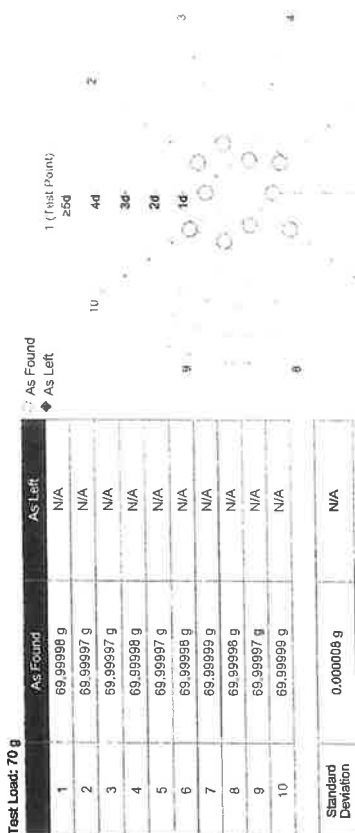
Calibration Guideline: EURAMET cg-18 v. 4.0 (11/2015)
CP/M002/20

Calibration Guideline: METTLER TOLEDO Work Instruction:
This calibration certificate contains measurements for As Found calibration. No As Left calibration was performed because the device was not modified after As Found calibration. Therefore, results for As Left correspond to As Found.
The sensitivity/span of the weighing instrument was adjusted before calibration with a built-in weight.
In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

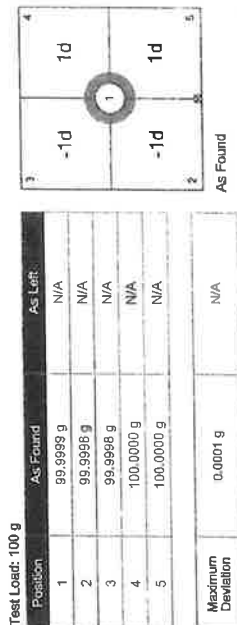
As Found	Start: 26.9 °C	End: 26.8 °C	Start: 73.8 %	End: 71.9 %
Temperature	Humidity			

As Found Calibration Date: 22-Jul-2021
As Left Calibration Date: N/A
Issue Date: 23-Jul-2021
Approved Signatory: [REDACTED]

Measurement Results Repeatability



Eccentricity



Remarks

FACT adjustment functionality activated
Equipment condition: Good
Next calibration according to customer's procedure

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

Error of Indication

As Found	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k*
1	0.00000 g	0.00000 g	0.00000 g	0.017 mg	2
2	0.01000 g	0.01000 g	0.00000 g	0.019 mg	2
3	0.10000 g	0.09999 g	-0.00001 g	0.023 mg	2
4	1.00000 g	1.00000 g	0.00000 g	0.032 mg	2
5	4.99999 g	5.00000 g	0.00002 g	0.048 mg	2
6	9.99999 g	10.00001 g	0.00002 g	0.061 mg	2
7	20.00001 g	20.00005 g	0.00004 g	0.082 mg	2
8*	49.99993 g	49.99997 g	0.00004 g	0.12 mg	2
9	99.99999 g	99.99999 g	0.00000 g	0.21 mg	2
10	149.9998 g	149.9998 g	0.0000 g	0.32 mg	2
11	199.9998 g	199.9998 g	0.0000 g	0.37 mg	2

*The calculated uncertainty was replaced by the CMC (Calibration and Measurement Capabilities) value because the calculated uncertainty was smaller than the CMC value.



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor k – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML E2			
Weight Set No.:	WS28	Date of Issue:	17-Nov-2020
Certificate Number:	170241	Calibration Due Date:	15-May-2022
Thermo Hygrometer			
Equipment No.:	IN51	Date of Issue:	02-Mar-2021
Certificate Number:	211403	Calibration Due Date:	23-Feb-2022

Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with $k=2$ in use. The formula shall be used for the estimation of the uncertainty under consideration of a series of indication. The value B represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use:

 $1.5 \cdot 10^{-6} / \text{K}$

Temperature range on site for the evaluation of the measurement uncertainty in use:

5K

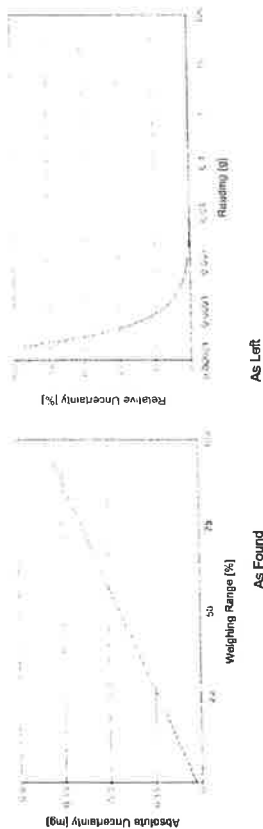
Linearization of Uncertainty Equation

Linearization of Uncertainty Equation			As Found	As Left
	Range	d		
1	0.00001 g	81 g	$U_1 = 0.018 \text{ mg} + 0.00608 \text{ mg/g} \cdot R$	N/A
2	0.0001 g	220 g	$U_2 = 0.06 \text{ mg} + 0.00603 \text{ mg/g} \cdot R$	N/A

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

About Us and Relative Measurement Uncertainty In Use for Various Net Indications (Examples)

	Net Indication	As Found	As Left
	0.00220 g	0.018 mg	N/A
	0.02200 g	0.018 mg	N/A
	0.22000 g	0.019 mg	N/A
	2.20000 g	0.031 mg	N/A
	226.0000 g	1.4 mg	N/A



The uncertainty range shown in the absolute uncertainty graph refers to the first interval/range of the device.



**GWP®
Certificate**

As Found



As Left

The weighing device meets the given process requirements.

The weighing device meets the given process requirements.

Tests Performed:



5. Found



As Left

No adjustments/modifications made. As Left results correspond to As Found.

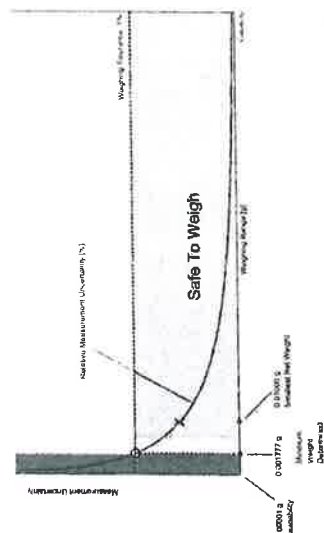
Process Requirements

Weighing Tolerance: 1 %

Smallest Net Weight: 0.01000 g

Safety Factor: 2

Safe Weighing Range



While the values in this graph reflect the actual calibration results, the measurement uncertainty curves are simply a visual representation. This graph reflects As-Left testing, unless only As-Found was performed.

Measurement Results

Results Summary

As Found	Repeatability	As Left	Error of Indication
✓	✓	✓	✓

✓ = Passed
✗ = Failed
NA = Safety Factor not met

Repeatability

Test Load: 70 g

Tolerance	Control Limit	As Found	Std. Deviation	Result	As Left
0.1%	0.000005 g	✓		✓	✓
0.2%	0.000010 g	✓		✓	✓
0.5%	0.000025 g	✓		✓	✓
1%	0.000050 g	✓	0.000008 g	✓	✓
2%	0.000100 g	✓		✓	✓
5%	0.000250 g	✓		✓	✓

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

Eccentricity

Test Load: 100 g

Tolerance	Control Limit	As Found	Deviation	Result	As Left
0.1%	0.0500 g	✓		✓	✓
0.2%	0.1000 g	✓		✓	✓
0.5%	0.2500 g	✓		✓	✓
1%	0.5000 g	✓	0.0001 g	✓	✓
2%	1.0000 g	✓		✓	✓
5%	2.5000 g	✓		✓	✓

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

Minimum Weight

As Found Minimum Weight Table

Range 1

Minimum weights for different weighing tolerances and safety factors					
Tolerance	1	2	3	5	10
0.1%	0.017873 g	0.035965 g	0.054282 g	0.091605 g	0.189140 g
0.2%	0.008909 g	0.017873 g	0.026891 g	0.045095 g	0.091605 g
0.5%	0.003537 g	0.007123 g	0.010697 g	0.017873 g	0.035965 g
1%	0.001777 g	0.003537 g	0.005339 g	0.008909 g	0.017873 g
2%	0.000888 g	0.001777 g	0.002667 g	0.004448 g	0.008909 g
5%	0.000355 g	0.000711 g	0.001066 g	0.001777 g	0.003537 g

The minimum weight table applies to the fine range of the weighing device.

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

As Left Minimum Weight Table

Range 1

Minimum weights for different weighing tolerances and safety factors					
Tolerance	1	2	3	5	10
0.1%	0.017873 g	0.035965 g	0.054282 g	0.091605 g	0.189140 g
0.2%	0.008909 g	0.017873 g	0.026891 g	0.045095 g	0.091605 g
0.5%	0.003537 g	0.007123 g	0.010697 g	0.017873 g	0.035965 g
1%	0.001777 g	0.003537 g	0.005339 g	0.008909 g	0.017873 g
2%	0.000888 g	0.001777 g	0.002667 g	0.004448 g	0.008909 g
5%	0.000355 g	0.000711 g	0.001066 g	0.001777 g	0.003537 g

The minimum weight table applies to the fine range of the weighing device.

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1/1 (no safety factor), 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with $k = 2$ and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

- If "N/A" is shown above, no appropriate value could be calculated.
- METTLER TOLEDO is not responsible for the definition of the process requirements.

METTLER TOLEDO Service

Attachment to Calibration Certificate:
TH2046-059-072221-ACC-TH
GWP® Certificate

Error of Indication

As Found

Reference Value		Control limits for various weighing tolerances						
		Error	0.1%	0.2%	0.5%	1%	2%	5%
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A	N/A
20.00001 g	0.00004 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g	0.50000 g
49.99993 g	0.00004 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g	1.25000 g
99.99995 g	0.00000 g	0.05000 g	0.10000 g	0.25000 g	0.50000 g	1.00000 g	2.50000 g	2.50000 g
149.99998 g	0.00000 g	0.07500 g	0.15000 g	0.37500 g	0.75000 g	1.50000 g	3.75000 g	3.75000 g
199.99998 g	0.00000 g	0.10000 g	0.20000 g	0.50000 g	1.00000 g	2.00000 g	5.00000 g	5.00000 g
Result		✓	✓	✓	✓	✓	✓	✓

As Left

Reference Value		Control limits for various weighing tolerances						
		Error	0.1%	0.2%	0.5%	1%	2%	5%
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A	N/A
20.00001 g	0.00004 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g	0.50000 g
49.99993 g	0.00004 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g	1.25000 g
99.99995 g	0.00000 g	0.05000 g	0.10000 g	0.25000 g	0.50000 g	1.00000 g	2.50000 g	2.50000 g
149.99998 g	0.00000 g	0.07500 g	0.15000 g	0.37500 g	0.75000 g	1.50000 g	3.75000 g	3.75000 g
199.99998 g	0.00000 g	0.10000 g	0.20000 g	0.50000 g	1.00000 g	2.00000 g	5.00000 g	5.00000 g
Result		✓	✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.

METTLER TOLEDO

Service Date: 2021-07-22
Document Number: TH2046-542-072221-LABBalanceHR
EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhaphiban 8 Rd., Nong Kham, Sriracha, Chonburi 20200
Sasiporn Nakin

Balance Health Report

Device Details	
System Details	
Manufacturer:	Mettler Toledo
Model:	XS205DU
Serial number:	1126323724
Firmware:	4.00 / 5.61
Weight set for routine testing:	Yes /
History	
Device History	
Instrument in use:	Yes
Instrument age:	> 10 years
Spare parts available:	Yes
Regulations:	ISO
Process tolerance in %:	1%
Smallest sample net weight:	0.01000 g
Service History	
Last preventive maintenance:	< 1 year
Last instrument calibration:	< 1 year
Last minimum weight determination:	Never
Routine testing performed:	Yes
Check List	
Environmental Conditions	
Room temperature fluctuation	✓
Exposure to direct sun	✓
Vibrations	✓
Draft	✓
Dirt or dust	✓
Static	✓
Mechanical Component Checks	
Draft shield	✓
Weighing pan position	✓
Housing	✓
Other - objections noted as additional remarks	—
General & Functional Checks	
Leveling	✓
Cleanliness	✓
Completeness - missing parts see additional remarks	✓
Settings optimized for operating environment	✓
Other - objections noted as additional remarks	—
Electrical Component Checks	
Power supply	✓
Sliding door drive	✓
Internal weight drive	✓
Display	✓
Other - objections noted as additional remarks	—
Recommendations	
Measurement Result Quality	
Instrument calibration	Uninstall instrument
Identify safe weighing range	Replace instrument
GWP verification / risk assessment	Replace add parts (see additional remarks)
Preventive maintenance	Onsite repair
Perform routine testing with test weights	Depot repair
User training	Use of accessories (see additional remarks)
Contact	Phone: 090513303 Email: dt_lab@en.1992.com
Name: Sasiporn Nakin	Position:
Additional Remarks & Recommendations	
Engineer Details	
Date:	22-Jul-2021
Name:	
Signature:	

This is not a certificate.
It should not be used to interpret final results for the testing of these devices.

Legend: ✓ Good/Pass ⚠ Needs Attention ✗ Bad/Fail — Not Applicable

846/4 - 846/5 Lachan Rd., Bangna Tai Sub-District, Bangna District, Bangkok 10260, +66 2723 0382
MTH ServiceSupport@mt.com
www.mt.com

METTLER TOLEDO Service

Report Version: 1.34, Software Version: 4.20.0.2 Page: 11 of 11

BAROMETER

Equipment : Analog Barometer

ID No. / Tag No. : BM001/41



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD
214 Bangpak Rd. Bangpai Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Certificate No.: AD2106-032-0001
Date Issued : 04-Jun-21

Customer : Eastern Thai Consulting 1992 Co., Ltd.
683 Moo 11 Sukhapibam 8 Rd., Nongkham, Sriracha, Chonburi 20230

Equipment : Analog Barometer

Manufacturer : Barigo
Model : -

Serial No. : -

ID No./Tag No. : BM001/41

Date Received : 02-Jun-21

Date Calibrated : 04-Jun-21

Calibrated by : [REDACTED]

Calibration Method or Calibration Procedure Used

In-house method : CP-21 base on DKD-R 6-1: Edition 3 2014.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Technical Manager, Miracle International Technology Company Limited.

Approved by :



Page 1 of 2

Certificate No.: AD2106-032-0001

Environment : Ambient Temperature : (25 ± 2)°C

Relative Humidity : (50 ± 15)%RH

STD Reading hPa	UUC Reading (hPa) Before Adjusted	UUC Reading (hPa) After Adjusted	UUC Error hPa	Uncertainty ± hPa
990.00	990.0	-	0.00	0.91
1000.00	1000.0	-	0.00	0.91
1010.00	1010.0	-	0.00	0.91
1020.00	1020.0	-	0.00	0.91
1030.00	1030.0	-	0.00	0.91

STD = Standard

UUC = Unit Under Calibration

Calibrated condition :

Pressure Medium

Mounting Position

Reference Level

Air : Density = 1.19 kg/m³ @ 20°C, 1 bar

Vertical

at center of its dial

Description of UUC :

Range

955 - 1075 hPa Absolute

Calibration Range

990 - 1030 hPa Absolute

Scale Interval

1 hPa

Resolution

0.5 hPa Absolute

Measurement Standards Used & Traceability :

The International System of Units (SI) through

IRPC Certificate No. CL1-P210029 for Digital Barometer Serial No. 290185, Due 19-Oct-21

End of Certificate

Page 2 of 2

CERTIFICATE OF ANALYSIS

EPA PROTOCOL GAS

Cylinder No. : EB0145030

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E03NI99E15AC0U4
Cylinder Number: EB0145030
Laboratory: 124 - Plumsteadville - PA
PGVP Number: A12021
Gas Code: CH4,PPN,BALN

Reference Number: 160-402242242-1
Cylinder Volume: 144.4 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 350
Certification Date: Oct 15, 2021

Expiration Date: Oct 15, 2029

Certification performed in accordance with EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)* document EPA 000R-12/031, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. The cylinder is subject to periodic re-assay 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
METHANE	180.0 PPM	177.0 PPM	G1	+/- 1.0% NIST Traceable	10/15/2021
PROPANE	185.0 PPM	187.0 PPM	G1	+/- 1.0% NIST Traceable	10/15/2021
NITROGEN	Balance				
CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
LNTRM	08011503	K002564	246.7 PPM METHANE/AIR	+/- 0.6%	May 15, 2025
SO TRM	200602-06	8162860Y	243.3 PPM PROPANE/AIR	+/- 0.5%	Mar 17, 2027
ANALYTICAL EQUIPMENT					
Instrument/Make/Model			Analytical Principle	Last Multipoint Calibration	
Nicolet ISS0 FTIR AUP2110295 CH4			FTIR	Oct 13, 2021	
Nicolet ISS0 FTIR AUP2110295 C3H8			FTIR	Oct 14, 2021	

Triad Data Available Upon Request

NOTES:

Gross Weight: 28.0 Kg
Net Weight: 4.9 Kg
PO# 5221004861



DRY GAS METER MC-572-V

Serial No. : 1007055

METHOD 5 PRE-TEST CONSOLE CALIBRATION

☒ Preventive Maintenance & Check

USING REFERENCE METER # WET TEST METER W-NK5A No. 540961

5-POINT METRIC UNIT

Meter Console Information	
Console Model Number	MC-572-V
Console Serial Number	1007055
DGM Model Number	SK25EX
DGM Serial Number	0005459

Calibration Conditions			
Date	Time	15-Jun-21	8:30 AM
Calibration Reference No.	GC64APE0037		
Barometric Pressure	751	mm Hg	
Calibration Meter Gamma	0.9980	unitless	

Factors/Conversions		
Std Temp	298	K
Std Press	760	mm Hg
K ₁	0.392	

Calibration Data									
Run Time		Metering Console				Calibration Meter			
Elapsed (t)	DGM Orifice (P ₀)	Volume Initial (V ₀)	Volume Final (V ₁)	Outlet Temp Initial (t ₀)	Outlet Temp Final (t ₁)	Volume Initial (V ₀)	Volume Final (V ₁)	Outlet Temp Initial (t ₀)	Outlet Temp Final (t ₁)
min	mm H ₂ O	m ³	m ³	°C	°C	m ³	m ³	°C	°C
15.00	13.0	342.0737	342.2483	25	26	204.97437	205.17455	27	26
10.00	25.0	342.2809	342.4463	26	26	205.21227	205.39526	26	26
8.00	50.0	342.4747	342.6575	26	26	205.42618	205.62204	26	26
7.00	80.0	342.6743	342.8792	26	26	205.63987	205.85738	26	26
5.00	120.0	342.9033	343.0823	26	26	205.88286	206.07264	26	26

Standardized Data				Results				
Dry Gas Meter		Calibration Meter		Calibration Factor		Dry Gas Meter		
(V _{meter})	(Q _{meter})	(V _{wet})	(Q _{wet})	Value (Y)	Variation (ΔY)	Flowrate Std & Corr (Q _{meter})	ΔH @ (ΔH@)	Variation (ΔΔH@)
m ³	m ³ /min	m ³	m ³ /min			m ³ /min	mm H ₂ O	
0.172	0.011	0.196	0.013	0.985	0.004	0.011	45.997	0.533
0.163	0.016	0.180	0.018	0.983	0.002	0.016	44.060	-1.403
0.181	0.023	0.192	0.024	0.982	0.001	0.022	46.266	0.803
0.203	0.029	0.214	0.031	0.979	-0.002	0.028	45.386	-0.077
0.178	0.036	0.186	0.037	0.978	-0.003	0.035	45.606	0.143
				0.981	Y Average	45.463 ΔH@ Average		

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter. The acceptance of individual values from the average is ± 0.02 .Note: For ΔH₀, orifice pressure differential that equates to 0.75cfm (0.0212m³/min) at standard temperature and pressure. Acceptable tolerance of individual values from the average is ± 0.2 inches (5.1mm) H₂O.

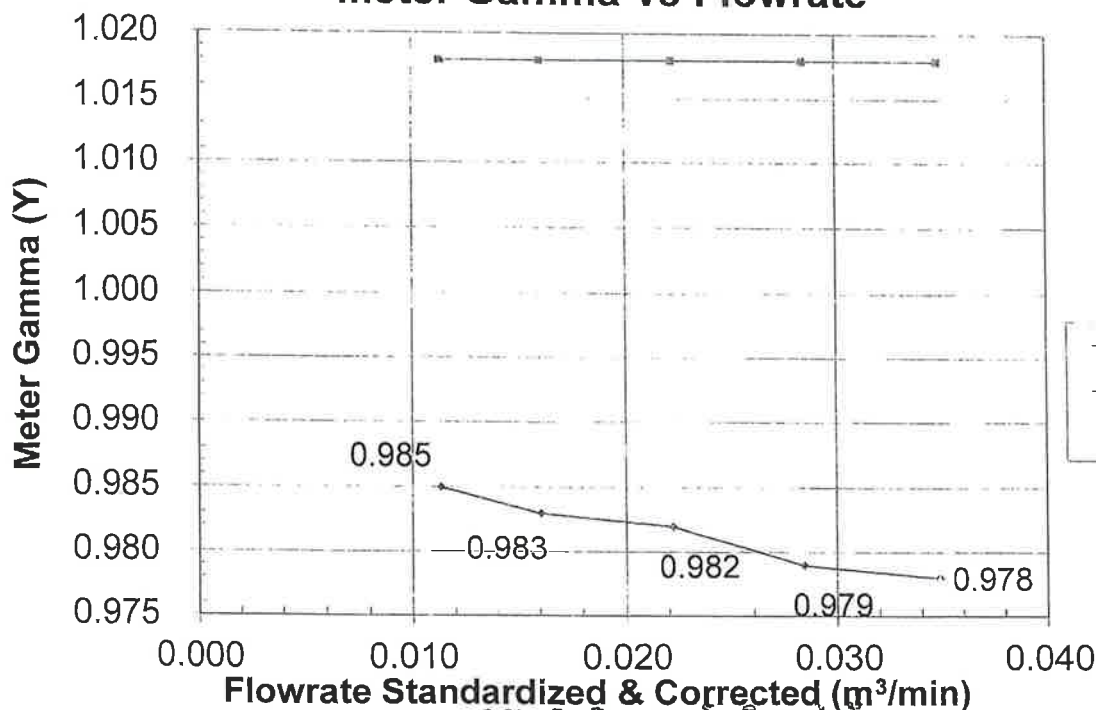
SITHIPHORN ASSOCIATES COMPANY LIMITED

Signature

Date

15/06/2021

Meter Gamma vs Flowrate



Console Serial: 1007055

บริษัท สิทธีพรแอสโซซิเอต จำกัด
SITHIPHORN ASSOCIATES COMPANY LIMITED

Console Model:

MC-572-V

THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information	
Console Model Number	MC-572-V
Console Serial Number	1007055
DGM Model Number	SK25EX
DGM Serial Number	0005459
Meter Box Model Number	JENCO 765
Meter Box Serial Number	JC02484

Calibration Conditions	
Date	15-Jun-21
Time	8:30 AM
Calibration Reference No.	GC64APE0037
Barometric Pressure	756
Reference Thermometer	FLUKE 714
Serial Number	9038005

Results	
Console Thermocouple Simulator	
Meter Box Channel Temperature Reading (°C)	
Channel and test point	
Stack	-18.0 38.0 93.0 149.0 260.0 371.0 482.0 593.0 816.0 1038.0
Probe	-17 25 38 94 150 262 372 485 596 819 1043
Filter	-17 25 38 94 150
Aux	-17 25 38 94 150
Exit	-17 25 38

Stack
Probe
Filter

Tolerance Range

± 1.50% Absolute
± 3.0 °C
± 3.0 °C

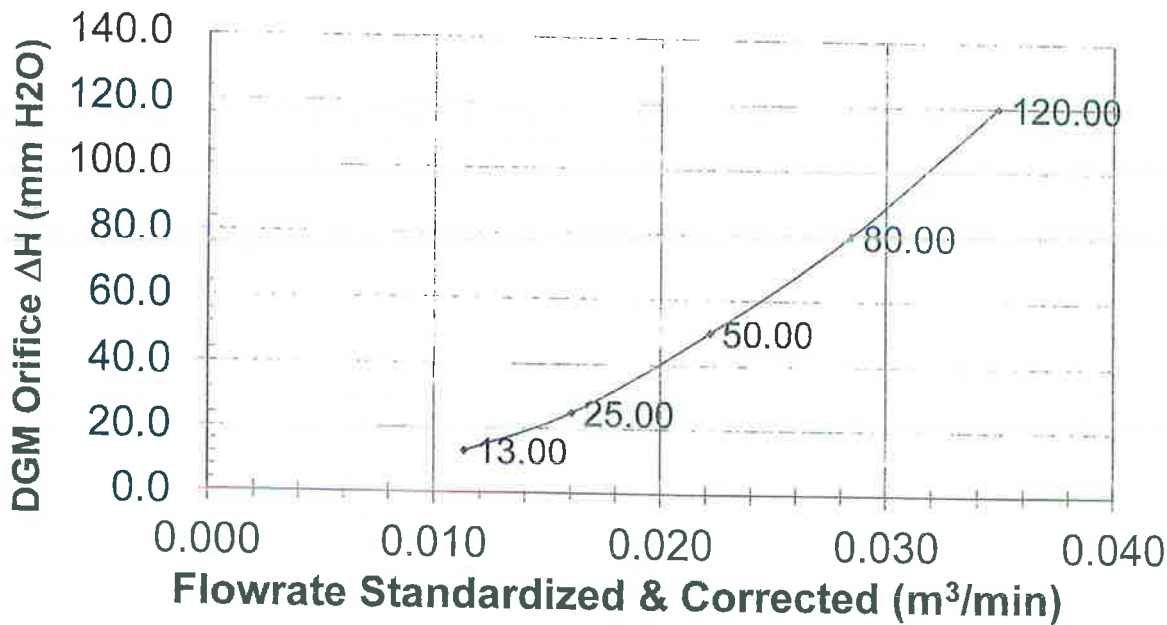
Meter
Exit

± 3.0 °C
± 2.0 °C

บริษัท สิทธีพรแอสโซซิเอต จำกัด
SITHIPORN ASSOCIATES COMPANY, LTD.

Signature

Meter Pressure vs Flowrate



Console Serial:

1007055

บริษัท สิทธีพรแอสโซซิเอต จำกัด
SITHIPORN ASSOCIATES COMPANY LIMITED

Console Model:

MC-572-V

DRY GAS METER XC-572-V

Serial No. : A2007510

METHOD 5 PRE-TEST CONSOLE CALIBRATION
USING REFERENCE METER # WET TEST METER W-NK5A No. 540961

5-POINT METRIC UNIT

Meter Console Information	
Console Model Number	XC-572-V
Console Serial Number	A2007510
DGM Model Number	SK25EX
DGM Serial Number	00005115

Calibration Conditions			
Date	Time	11-Aug-21	1:00 PM
Calibration Reference No.	GC64APE0040		
Barometric Pressure	761	mm Hg	
Calibration Meter Gamma	0.9980	unitless	

Factors/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
K ₁	0.386	

Calibration Data									
Run Time	Metering Console					Calibration Meter			
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final
(@)	(P _o)	(V _o)	(V _o)	(t _o)	(t _o)	(V _w)	(V _w)	(t _w)	(t _w)
min	mm H ₂ O	m ³	m ³	°C	°C	m ³	m ³	°C	°C
15.00	13.0	192.9377	193.1065	25	25	217.64994	217.82028	25	25
10.00	25.0	193.1438	193.3008	25	25	217.85800	218.01650	25	25
8.00	50.0	193.3330	193.5109	25	25	218.04911	218.22929	25	25
7.00	80.0	193.5431	193.7402	25	25	218.26189	218.46254	25	25
5.00	120.0	193.7826	193.9548	25	25	218.50573	218.68184	25	25

Standardized Data				Results				
Dry Gas Meter		Calibration Meter		Calibration Factor		Dry Gas Meter		
(V _{std})	(Q _{std})	(V _w)	(Q _w)	Value	Variation	Std & Corr	$\Delta H @$	Variation
m ³	m ³ /min	m ³	m ³ /min	(Y)	(ΔY)	(Q _{std})	(ΔH@)	(ΔΔH@)
						m ³ /min	mm H ₂ O	
0.166	0.011	0.167	0.011	1.006	-0.001	0.011	46.495	0.632
0.155	0.015	0.156	0.016	1.005	-0.002	0.016	46.005	0.141
0.176	0.022	0.177	0.022	1.006	-0.001	0.022	45.788	-0.076
0.195	0.028	0.197	0.028	1.008	0.001	0.028	45.491	-0.373
0.171	0.034	0.173	0.035	1.009	0.002	0.035	45.540	-0.324
				1.007	Y Average		45.864	ΔH@ Average

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ± 0.02

Note: For $\Delta H @$, orifice pressure differential that equates to 0.75cfm (0.0212m³/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is ± 0.2 inches (5.1mm) H₂O

Signature

บริษัท สิทธีพรแอสซิเอต จำกัด

SITHIPORN ASSOCIATES COMPANY

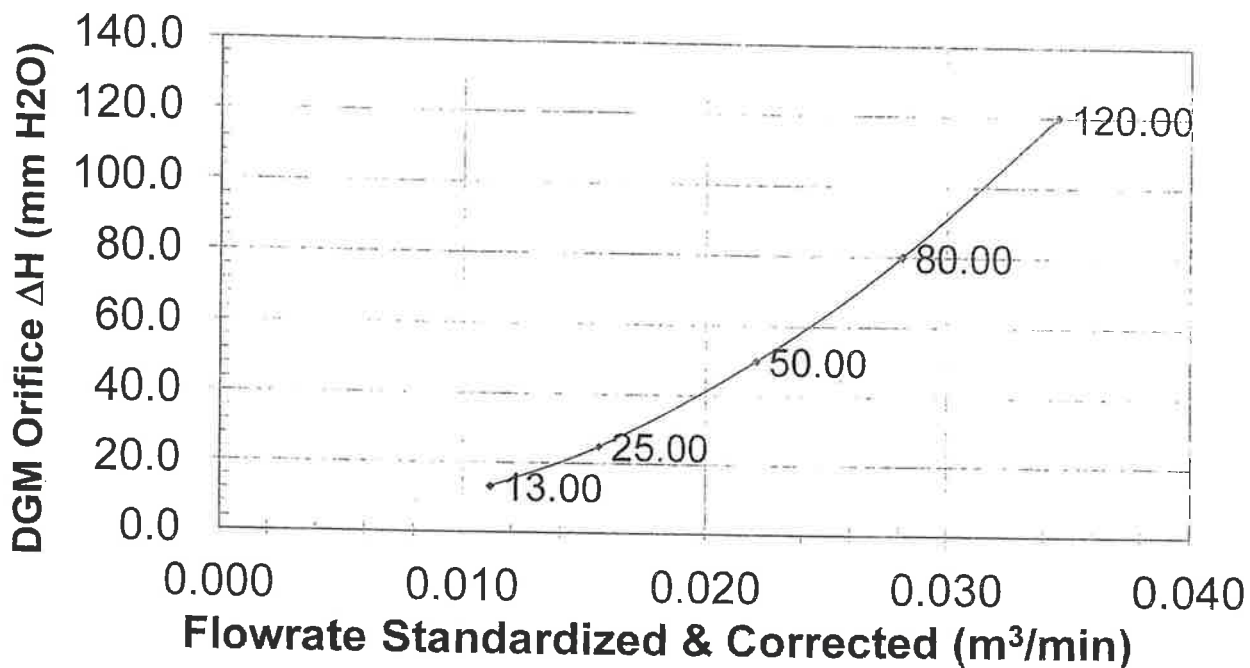
Date

11/8/2021

Calibration Date: 25-2-2014

Calibration Reference No: VO57AP0011

Meter Pressure vs Flowrate



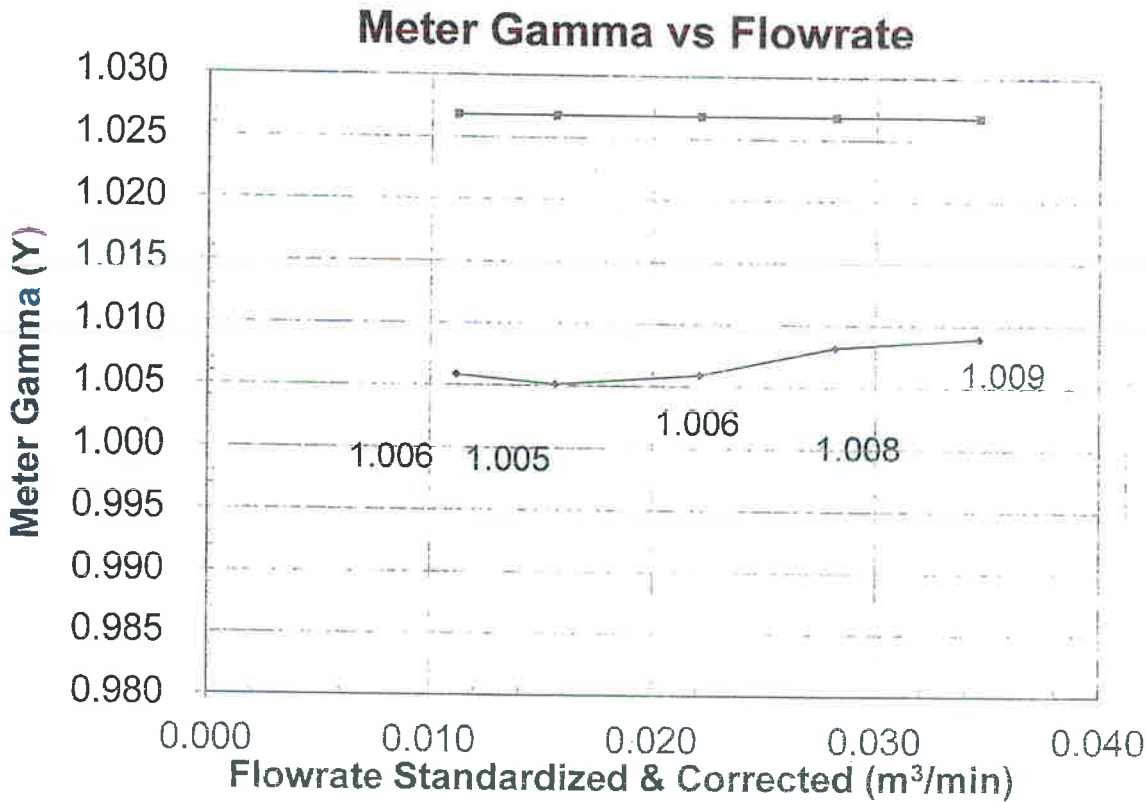
Console Serial:

A2007510

บริษัท สิทธีพรแอสซิเอต จำกัด
SITHIPORN ASSOCIATES COMPANY LIMITED

Console Model:

XC-572-V



Console Serial: A2007510

บริษัท สิทธีพรแอสโซซิเอต จำกัด
 SITHIPORN ASSOCIATES COMPANY LIMITED

Console Model:

XC-572-V

THERMOCOUPLES SYSTEM CALIBRATION

SITHIPORN

SA Environmental / Hygiene Products Division (EPD1)
 Web site : www.sithiporn.com & E-mail: service-ytd@sithiporn.com

Sampling System Equipment Information		Calibration Conditions	
Console Model Number	XC-572-V	Date	11-Aug-21
Console Serial Number	A2007510	Calibration Reference No.	GC64APE0040
DGM Model Number	SK25EX	Barometric Pressure	761 mm Hg
DGM Serial Number	00005115	Reference Thermometer	FLUKE 714
Meter Box Model Number	JENCO 765	Serial Number	9038005
Meter Box Serial Number	JC02982		

Results									
Console Thermocouple Simulator									
Channel and test point		Meter Box Channel Temperature Reading (°C)							
		-18.0	25.0	38.0	93.0	149.0	260.0	371.0	482.0
Stack		-18	25	38	94	150	261	370	481
Probe		-17	25	37	93	147			593
Filter		-17	25	37	93	148			815
Aux		-17	25	37	93	150			1037
Exit		-17	25	38					

Stack ± 1.50% Absolute
 Probe ± 3.0 °C
 Filter ± 3.0 °C

Note: Temperature difference ≤ 1.5%

Tolerance Range

Meter Exit

± 3.0 °C
± 2.0 °C

Signature

บริษัท สิทธีพรแอสโซซิเอต จำกัด
 SITHIPORN ASSOCIATES COMPANY LIMITED

บริษัท สิทธีพร แอสโซซิเอต จำกัด

Sithiporn Associate

451-451/1 ถนนสีหราช แขวงบางนาใต้ เขตบางพลี กรุงเทพมหานคร 10700 โทร. 0-2433-8831, 0-2435-8800, 0-2434-9191 แฟกซ์ : 0-2433-1679, 0-2434-9510
 451-451/1 Sindhorn Road, Bangbunru, Bangplud, Bangkok 10700 Thailand Tel. (662) 433-8331, 435-8800, 434-9191 Fax: (662) 433-1679, 434-9510

DRY GAS METER MC-572

Serial No. : 0011024

METHOD 5 PRE-TEST CONSOLE CALIBRATION
USING REFERENCE METER # WET TEST METER W-NK5A No. 540961

5-POINT METRIC UNIT

Meter Console Information	
Console Model Number	MC-572
Console Serial Number	0011024
DGM Model Number	SK25EX
DGM Serial Number	00005437

Calibration Conditions			
Date	Time	07-Jan-22	1:00 PM
Calibration Reference No.	HC65APE0005		
Barometric Pressure	759	mm Hg	
Calibration Meter Gamma	0.9980	unitless	

Factors/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
K ₁	0.386	

Calibration Data									
Run Time	Metering Console					Calibration Meter			
Elapsed	DGM Orifice	Volume	Volume	Outlet Temp	Outlet Temp	Volume	Volume	Outlet Temp	Outlet Temp
(t)	ΔH	Initial	Final	Initial	Final	Initial	Final	Initial	Final
(t)	(P _o)	(V _i)	(V _f)	(t _i)	(t _f)	(V _i)	(V _f)	(t _i)	(t _f)
min	mm H ₂ O	m ³	m ³	°C	°C	m ³	m ³	°C	°C
15.00	13.0	519.3522	519.5372	25	25	248.31965	248.50831	25	25
10.00	25.0	519.5505	519.7196	25	25	248.52318	248.69613	25	25
8.00	50.0	519.7505	519.9399	25	25	248.72918	248.92339	25	25
7.00	80.0	519.9562	520.1641	25	25	248.94255	249.15608	25	25
5.00	120.0	520.1817	520.3645	25	25	249.17802	249.36602	25	25

Standardized Data				Results				
Dry Gas Meter		Calibration Meter		Calibration Factor		Dry Gas Meter		
(V _{avg}) m ³	(Q _{avg}) m ³ /min	(V _w) m ³	(Q _w) m ³ /min	Value (Y)	Variation (ΔY)	Flowrate Std & Corr (Q _{std}) m ³ /min	ΔH @ (ΔH@) mm H ₂ O	Variation (ΔH@)
0.182	0.012	0.185	0.012	1.016	-0.001	0.012	38.004	-1.317
0.166	0.017	0.169	0.017	1.018	0.001	0.017	38.741	-0.580
0.187	0.023	0.190	0.024	1.018	0.001	0.024	39.516	0.195
0.206	0.029	0.209	0.030	1.017	0.000	0.030	40.276	0.955
0.181	0.036	0.184	0.037	1.015	-0.002	0.037	40.070	0.748
				1.017	Y Average		39.321	ΔH@ Average

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ± 0.02 .
Note: For $\Delta H_{1/2}$, orifice pressure differential that equates to 0.75cfm (0.0212m³/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is ± 0.2 inches (5.1mm) H₂O.

Signature

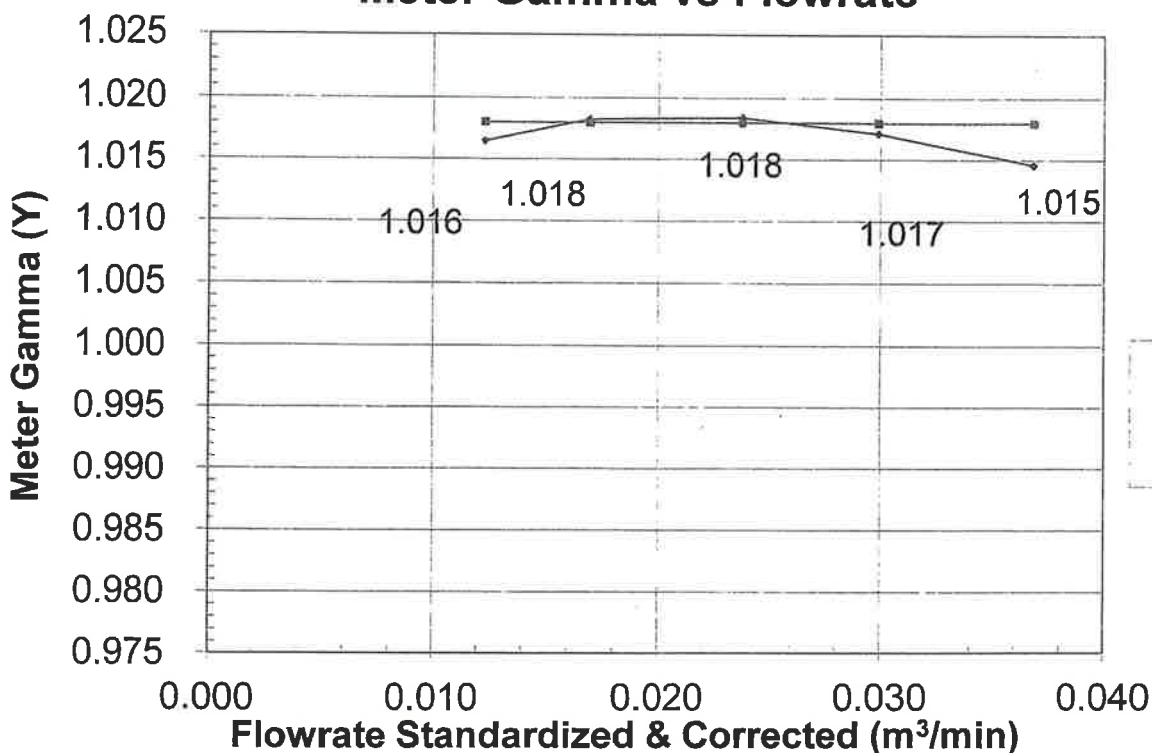
บริษัท สตีลพรแอตไฮจีเอจ จำกัด

Date 07/01/2022

Calibration Date: 25-2-2014

Calibration Reference No: V057AP0011

Meter Gamma vs Flowrate

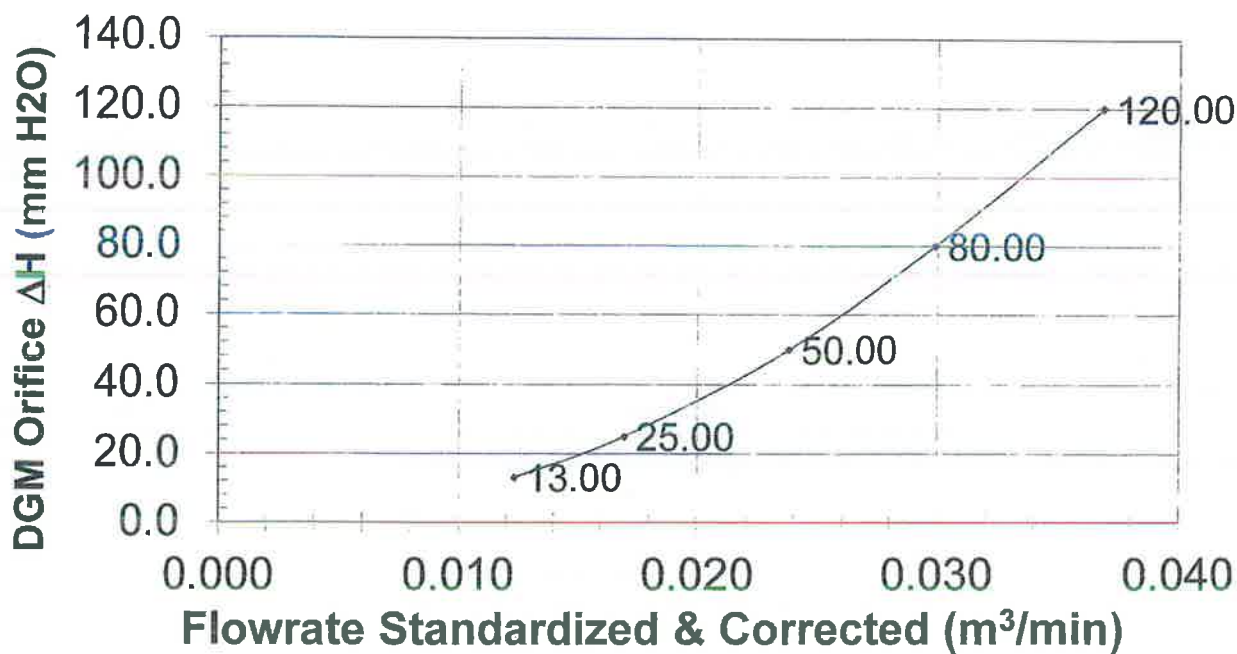


Console Serial: 0011024

Console Model:

บริษัท สตีลพรแอตไฮจีเอจ จำกัด
STEELPROTECT HYGIENE COMPANY LIMITED

COPY



Console Serial: 0011024

Console Model: MC-57

บริษัท สิทธีพรแอสโซซิเอต จำกัด
SITHIPORN ASSOCIATES COMPANY LIMITED

THERMOCOUPLES SYSTEM CALIBRATION

SITHIPORN ASSOCIATES

SA Environmental / Hygiene Products Division (EPD1)
Web site : www.sithiporn.com # E-mail: service-epd1@sithiporn.com

Sampling System Equipment Information		Calibration Conditions	
Console Model Number	MC-572	Date	07-Jan-22
Console Serial Number	0011024	Calibration Reference No.	HC85APE0005
DGM Model Number	SK25EX	Barometric Pressure	759 mm Hg
DGM Serial Number	00005437	Reference Thermometer	FLUKE 714
Meter Box Model Number	JENCO 765	Serial Number	9038005
Meter Box Serial Number	JC02982		

Results	
Console Thermocouple Simulator	
Channel and test point	Meter Box Channel Temperature Reading (°C)
	-18.0 25.0 38.0 93.0 149.0 260.0 371.0 482.0 593.0 816.0 1038.0
Stack	-18 25 38 94 150 261 372 483 595 817 1040
Probe	-18 25 38 94 150
Filter	-18 25 38 94 150
Aux	-18 25 38 94 150
Exit	-18 25 38

Stack $\pm 1.50\%$ Absolute $\pm 3.0^\circ\text{C}$
 Probe $\pm 3.0^\circ\text{C}$
 Filter $\pm 3.0^\circ\text{C}$

Note: Temperature difference $\leq 1.5\%$

Tolerance Range

Meter Exit $\pm 3.0^\circ\text{C}$
 $\pm 2.0^\circ\text{C}$

Signature

บริษัท สิทธีพรแอสโซซิเอต จำกัด
SITHIPORN ASSOCIATES COMPANY LIMITED

DRY GAS METER MC-572-V

Serial No. : 0504003

Meter Console Information	
Console Model Number	MC-572-V
Console Serial Number	0504003
DGM Model Number	SK25EX
DGM Serial Number	0005303

Calibration Conditions			
Date	Time	05-Apr-22	8:30 AM
Calibration Reference No.	HC65APE0026		
Barometric Pressure	761	mm Hg	
Calibration Meter Gamma	0.9980	unless	

Factors/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
K ₁	0.386	

Calibration Data									
Run Time		Metering Console				Calibration Meter			
Elapsed (0)	DGM Orifice ΔH (P ₀)	Volume Initial (V ₀)	Volume Final (V ₁)	Outlet Temp Initial (T ₀)	Outlet Temp Final (T ₁)	Volume Initial (V ₀)	Volume Final (V ₁)	Outlet Temp Initial (T ₀)	Outlet Temp Final (T ₁)
min	mm H ₂ O	m ³	m ³	°C	°C	m ³	m ³	°C	°C
15.00	13.0	234.9529	235.0859	27	27	276.54575	276.67750	27	27
10.00	25.0	235.1718	235.3277	27	27	276.76357	276.91678	27	27
8.00	50.0	235.3676	235.5510	27	27	276.95578	277.13668	27	27
7.00	80.0	235.5744	235.7803	27	27	277.15828	277.36140	27	27
5.00	120.0	235.8320	236.0136	27	27	277.41235	277.59265	27	27

Results								
Standardized Data				Dry Gas Meter				
Dry Gas Meter		Calibration Meter		Calibration Factor		Flowrate		ΔH @
(V _{meter})	(Q _{meter})	(V _{known})	(Q _{known})	Value (Y)	Variation (ΔY)	Std & Corr (Q _{calibrated})	.0212 m ³ /min (ΔH@)	Variation (ΔΔH@)
m ³	m ³ /min	m ³	m ³ /min			m ³ /min	mm H ₂ O	
0.130	0.009	0.129	0.009	0.987	0.007	0.009	78.243	25.850
0.153	0.015	0.149	0.015	0.978	-0.002	0.015	49.567	-2.826
0.180	0.023	0.176	0.022	0.980	-0.001	0.022	45.729	-6.665
0.203	0.029	0.198	0.028	0.977	-0.003	0.028	44.689	-7.705
0.180	0.036	0.176	0.035	0.979	-0.001	0.035	43.739	-8.654
				0.980	Y Average		52.393	ΔH@ Average

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ± 0.02 .

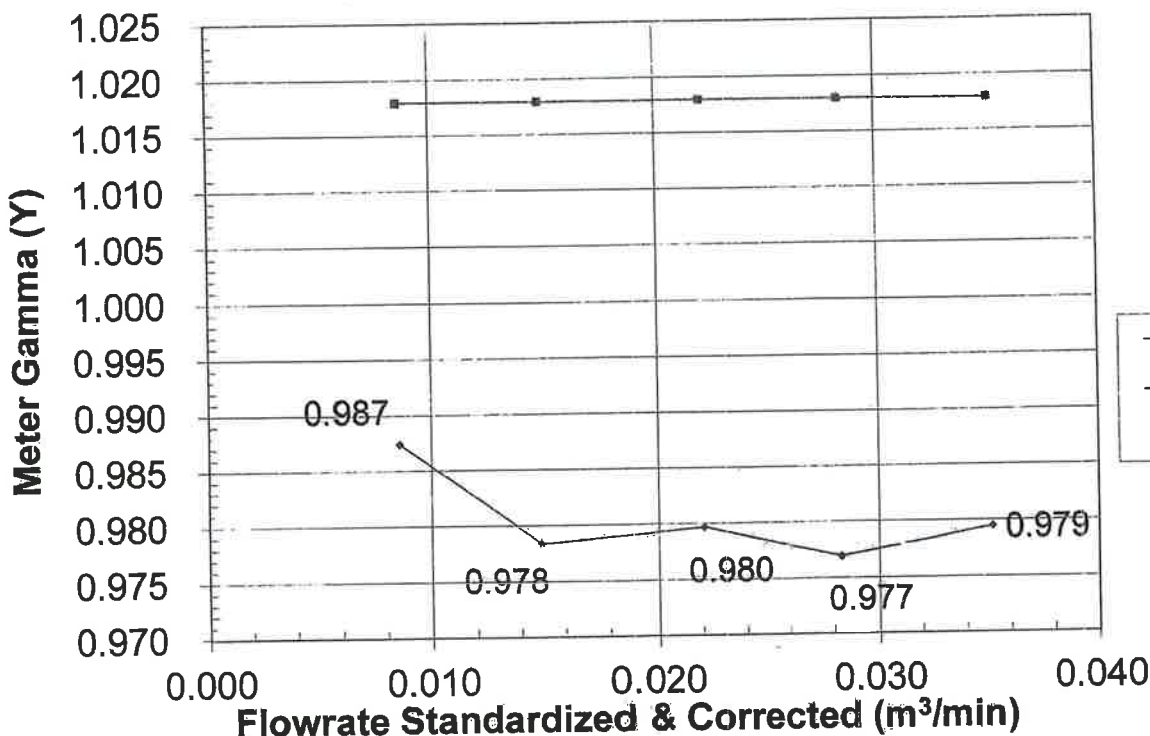
Note: For ΔH₀, orifice pressure differential that equates to 0.75cm (0.0212m³/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is ± 0.2 inches (5.1mm) H₂O.

Signature

บริษัท สกทิพรแอสซิเอตส์ จำกัด
SITHIPORN ASSOCIATES COMPANY

Date 5/4/2022

Meter Gamma vs Flowrate



→ Gamma Y
→ Max Allow Y
→ Min Allow Y

THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information	
Console Model Number	MC-572-V
Console Serial Number	0504003
DGM Model Number	SK25EX
DGM Serial Number	0005303
Meter Box Model Number	JENCO 765
Meter Box Serial Number	JC02484

Calibration Conditions	
Date	05-Apr-22
Calibration Reference No.	HC55APE0026
Barometric Pressure	761
Reference Thermometer	FLUKE 714
Serial Number	9038005

Results	
Console Thermocouple Simulator	
Channel and test point	Meter Box Channel Temperature Reading (°C)
-18.0	25.0
-18.0	38.0
-18.0	93.0
-18.0	149.0
-18.0	260.0
-18.0	371.0
-18.0	482.0
-18.0	593.0
-18.0	816.0
-18.0	1038.0
Stack	38
Probe	25
Filter	38
Aux	25
Exit	38

Stack
Probe
Filter

Tolerance Range

± 1.50% Absolute
± 3.0 °C
± 3.0 °C

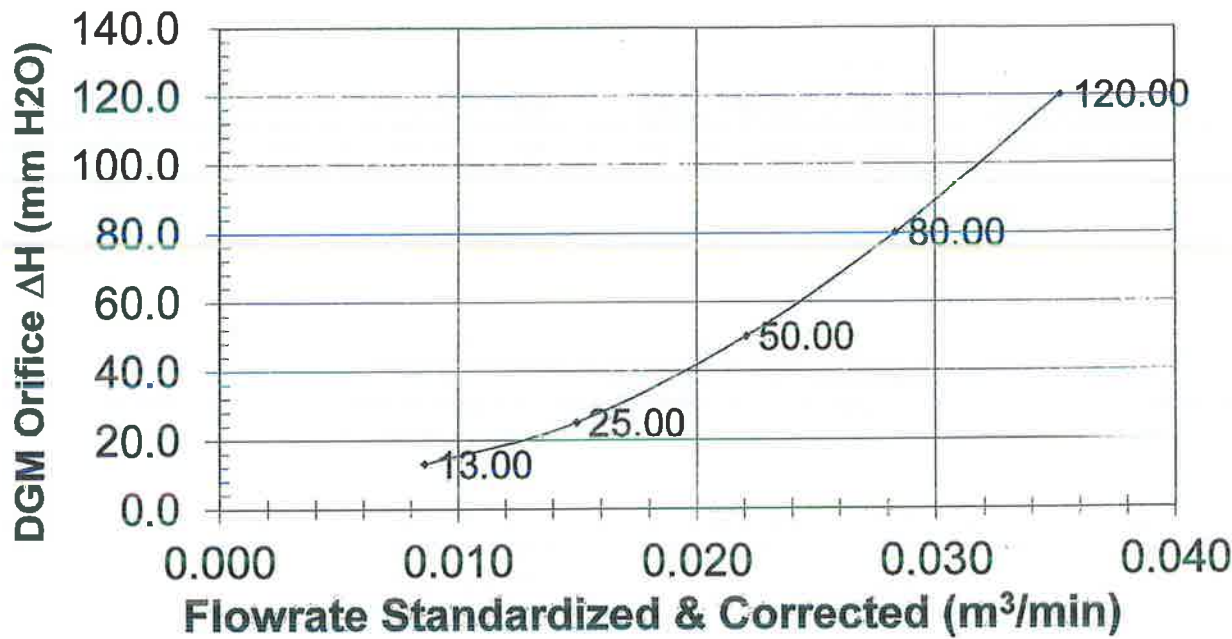
Meter
Exit

± 3.0 °C
± 2.0 °C

Signature

บริษัท อธิพรรมาโซลูชั่น จำกัด
SITHIPORN ASSOCIATES COMPANY LIMITED

Meter Pressure vs Flowrate



Console Serial:

0504003

บริษัท อธิพรรมาโซลูชั่น จำกัด
SITHIPORN ASSOCIATES COMPANY LIMITED

Console Model:

MC-572-V

บริษัท อธิพรรมาโซลูชั่น จำกัด

Sithiporn Associates Co., Ltd.

451-451/1 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10700 โทร. 0-2435-8891, 0-2435-8890, 0-2434-9181 แฟกซ์ : 0-2434-9510
451-451/1 Sirinthorn Road, Bangbunru, Bangkok 10700 Thailand Tel. (662) 433-8331, 435-8800, 434-9191 Fax: (662) 433-1679, 434-9510

E-MAIL : service@sithiporn.com www.sithiporn.com

Flue gas Analyzer

Testo 350XL

Serial No. 01859560

Certificate No: G 640712
Date of issue : 29-Oct-21

Instrument description : Flue gas Analyzer
Instrument model : Testo 350XL
Instrument serial no. : 01859560
ID no. or control no. : -
Manufacturer : testo SE
Probe description : -
Probe model : -
Probe serial : -
Customer name : Eastern Thai Consulting 1992 Company Limited
Customer address : 683 Moo 11, Sukhapibarn 8 Road, Nongkham, Si Racha, Chon Buri 20280

Total pages of certificate : 2 Pages
Receiving no. : L-213012
Receiving date. : 28-Oct-21
Parameter of calibration : Gas Calibration (Oxygen 2.501, 10.00, 21.00 %vol, Carbon Monoxide 80.97, 309.9, 1003 ppm Nitrogen Dioxide 80.62 ppm, Sulphur Dioxide 100.9 ppm, Nitric Oxide 150.9 ppm)

Condition of UUC. : Used
Ambient condition : All of the Measurement were carried out the stabilized laboratory
Temperature : 23 \pm 5 $^{\circ}$ C
Humidity : 55 \pm 15 %RH
Calibration place : 17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210
Calibration procedure no. : WI-CL-28-C

The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. This certificate is applied only to item under test Environmental condition.
This Calibration Certificate may not be reproduced other than in full except with the permission of the issuing laboratory. Calibration certificates without signature and seal not valid.
This calibration certificate documents are traceability to national standards, which realize measurement according to the International System of Units (SI).

Date of calibration : 29-Oct-21

Certificate No.: G 640712

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O ₂) 2.501 % Vol	2431/19	Linde	16-Jul-23
Oxygen (O ₂) 10.00 % Vol	2453/19	Linde	18-Jul-23
Oxygen (O ₂) 21.00 % Vol	2426/19	Linde	16-Jul-23
Carbon monoxide (CO) 80.97 ppm	2842/21	Linde	24-Jun-23
Carbon monoxide (CO) 309.9 ppm	2803/21	Linde	22-Jun-23
Carbon monoxide (CO) 1003 ppm	2829/21	Linde	23-Apr-23
Nitrogen Dioxide (NO ₂) 80.62 ppm	3240/21	Linde	25-Jul-23
Sulphur Dioxide (SO ₂) 100.9 ppm	4942/20	Linde	20-Nov-22
Nitric Oxide (NO) 150.9 ppm	2857/21	Linde	27-Jun-23

Measured room conditions

Temperature : 23.6 $^{\circ}$ C **Humidity :** 57.8 %RH **Pressure :** 1014.1 mbar
Calibration conditions
Gas Temperature : 23 $^{\circ}$ C **Flow rate :** 1,100 ml/min **Gas pressure :** 1023.6 mbar
Calibration Results (without adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (\pm)
O ₂ (%Vol)	2.501	2.45	-0.051	0.20
O ₂ (%Vol)	10.00	9.86	-0.14	0.40
O ₂ (%Vol)	21.00	21.14	0.14	0.80
CO (ppm)	80.97	82	1.03	2.8
CO (ppm)	309.9	314	4.1	11
CO (ppm)	1003	1017	14	34
*NO ₂ (ppm)	80.62	80.2	-0.42	5.0
*SO ₂ (ppm)	100.9	102	1.1	5.0
*NO (ppm)	150.9	149	-1.9	5.0

Remark : 1 cmol/mol = 1 %vol , 1 μ mol/mol = 1 ppm.

* Calibrations marked Not TISI Accredited "in this Certificate have been included for completeness."

End of Report

Hot Air Oven

Model : UFE 500

Serial No. : G511.0182



Certificate No. : 22-011766

Sample Code : 22-04498-003

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapiban 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Laboratory)

Equipment : Temperature controlled enclosures (Hot air oven)
Manufacturer : Memmert
Model : UFE 500
Serial No. : G511.0182
ID No. : LABE17/4
Date of Receipt : 03 February 2022
Date of Calibration : 03 February 2022

Condition of Calibration

1. Environment
1.1 Ambient temperature : Maximum 27.5 °C : Minimum 26.4 °C
1.2 Relative humidity : Maximum 59.5 % : Minimum 50.8 %
1.3 Line voltage supplied : Maximum 225.1 VAC : Minimum 223.2 VAC

2. Calibration method

2.1 TLAS-G-20: Guidelines for calibration and checks of temperature controlled enclosures.

3. Reference standard instrument

Instrument	ID No.	Certificate No.	Due Date
Data Acquisition With Sensor (RTD-P100)	LB-DA-11 (RTD-148 to RTD-155, RTD-227)	21-041213	09 May 2022

4. This certificate is traceable to the international system of unit (SI Unit).

The measurement is traceable to Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.

5. This result of calibration was found accurate as shown on date and place of calibration only.**6. Condition of calibration item : Normal**

Calibrated by

Approved by

Issue date

11 February 2022

Signed for Director

Results of Calibration

Resolution : 0.5 °C

1. Reporting of Temperature

Calibration point (°C)	UUC* setting (°C)	UUC* reading (°C)	Measured temperature at each positions (°C)								Uncertainty ± (°C)	Coverage factor k	
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8			# 9 ^{Ref}
104	103.5	103.5	104.46	104.45	#####	104.07	104.46	104.42	104.34	104.07	104.30	0.53	2.00

2. Characterization results

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
104	0.12	0.80	1.13

Notes

- UUC* = Unit Under Calibration



Certificate No. : 22-011766

Sample Code : 22-04498-003

REPORT OF CALIBRATION

REPORT OF CALIBRATION

Certificate No. : 22-011786

Sample Code : 22-04498-003

Results of Calibration

Notes

1. Sensor installation locations
 - 1.1 All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
 - 1.2 The reference sensor is preferably located of the geometric center of the chamber.
2. Interior dimensions approx of chamber :

W = 56 cm ; D = 40 cm ; H = 48 cm
3. Air valve or fresh air level : Off
4. Fan level : Open

5. The quoted uncertainty includes "Stability of chamber and loading effect in chamber at 20% of uniformity".

6. 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.

7. Stability - one-half of the greatest maximum differences of measured temperatures at any one sensor.

8. Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.

9. UUC* reading - the average reading of indicating device that forms the integral part of the enclosure.

10. Calibration results without adjustment.

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

- End of Report -

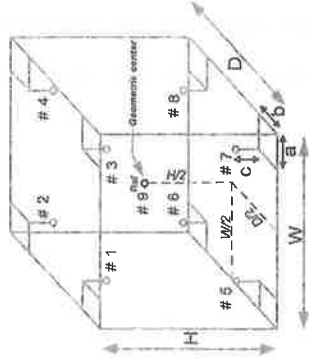


Figure. Example of sensor installation Positions

INDUCTIBELY COUPLED PLASMA SPECTROMETER

Model : Prodigy 7

Serial No. : P70177



บริษัท แอปพลิเคชัน ดีฟายน์ จำกัด
Application Define Company Limited
84 หมู่ 9 บางเขน 9 แขวง บางเขน เขต ดินแดง กรุงเทพมหานคร 10170
84 Soi Bangchuekknang 9 Bangkok Talingchan, Bangkok 10170
Tel: (66) 2864 7137 E-mail: support@apdefine.co.th Website : http://www.apdefine.co.th
เลขประจำตัวผู้เสียภาษี 0105558032461

CERTIFICATE OF INSTRUMENT PERFORMANCE

INSTRUMENT:

INDUCTIVELY COUPLED PLASMA SPECTROMETER

Teledyne Leeman Labs

Prodigy 7

P70177

Eastern Thai Consulting 1992 Co., Ltd

CUSTOMER:

CHECKING:

SPECTROMETER

Wavelength Accuracy check by use emission line of Hg Lamp

Mercury line 253.652 nm.

Plasma View (Dual View)

CMOS Detector check

Align View by Mn line 257.610 nm.

RF GENERATOR

Incident Power 1,200 ±10 Watt Reading = ...1.2... Watt

SAMPLE INTRODUCTION

Plasma Torch, Injector, Spray chamber, Nebulizer

Peristaltic pump & Tubing

EXHAUSTING & COOLING SYSTEM

Safety Interlock Switch (Door, Argon pressure, Water pressure)

Cooling System, water flowrate & low pressure switch

Flowrate of Air blower

COMPUTER & SOFTWARE

Plasma Ignition software & Analytical Software

ANALYTICAL TEST

Full Frame Capture & Echellogram check

Calibration Curve & QC Test

STATUS

OK

OK

OK

OK

OK

OK

OK

OK

OK

OK

OK

OK

OK

DATE:




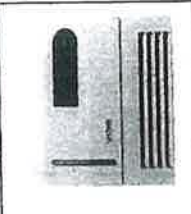




PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีสเทิร์นไทย คอนซัลติง 1992 จำกัด Date: December 21, 2021

Instrument: ICP-OES Model: Prodigy 7 SN: P70177

1. Gas Supply /Water Re-circulator/Exhaust Hood Check:

Gas system: ตรวจสอบแรงดันแก๊สและการรั่วซึม Argon Pressure: 45 psi (✓) No leak Nitrogen Pressure: - psi (✓) No leak Oxygen Pressure: - psi (✓) No leak	 
(✓) Change camera purge gas Dehydrator (1 times /years) Next time replacement CH ₂ O/C เปลี่ยนตัวดูดความชื้นที่เคสเครื่อง ทุก 1 ปี	
Water Chiller: RF generator flow rate 44 LPM Temperature 26 C ตรวจสอบอุณหภูมิ Leak inspected (✓) No leak ตรวจสอบการรั่วซึม	
Water Chiller: Camera (✓) check water level and refill ตรวจสอบระดับน้ำและเติมน้ำ (✓) change water เปลี่ยนน้ำยา Temperature -34 °C ตรวจสอบอุณหภูมิ	
Exhaust Hood Flow rate 150 CFM (system request > 150)	

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีทีที เทคโนโลยี คอนสตรัคชั่น จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	SN: P70177

2. Computer & Software Check

Description	Status
Interface Cable USB (✓) No broken	OK
Software Version	OK
(✓) Operation function check :	OK
(✓) Open /Save /Edit method	OK
(✓) Instrument Control	OK
(✓) Sequence	OK
(✓) Full Frame Capture (Echelle Mode)	OK
(✓) Auto alignment /Hg alignment	OK
(✓) Calibration Curve	OK
(✓) Re-Calculation	OK
(✓) Print Report	OK

COPY

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีทีที เทคโนโลยี คอนสตรัคชั่น จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	SN: P70177

3. Instrument Control

Description	Status
Optical view position: ตรวจสอบตำแหน่งที่มองเห็นคือเป็นหลอดจริง	
Hg Lamp Delta	
X -1 Y -4	OK
XUV 0	OK
Axial peak positions X3325 Y1205	OK
Radial peak positions X4111 Y1135	OK
Hg lamp peak positions X2245 Y2615	OK
Plasma Control ตรวจสอบการทำงานของหลอดและตัวหลอด	
(✓) Auto Start	OK
(✓) Extinguish	OK
(✓) RF power setting	OK
(✓) Igniter	OK
(✓) Air Knife	OK
Torch Gas: ตรวจสอบการทำงานของแก๊สที่ใช้บนพลาสมา	
(✓) Coolant/Plasma Flow control	OK
(✓) Aux Flow	OK
(✓) Nebulizer Flow	OK
(✓) Optimize sample introduction function	OK
(✓) Peristaltic pump control	OK
(✓) Auto sampler Control	OK
(✓) Camera Support Module	OK
(✓) Diagnostic	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท สานักงาน เทคโนโลยี 1992 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7

4. Cleaning & Replacement

Description	Status
✓ O-Ring Torch replacement	OK
✓ Pump Tubing replacement	OK
✓ Glassware cleaning (Torch, Nebulizer, Spray chamber)	OK
✓ Lube the roll peristaltic pump	OK
✓ Optical windows cleaning	OK
✓ Camera Water Re-circulator (water change/ refilled)	OK
✓ RF Generator Water Re-circulator (water change/ refilled)	OK
✓ Cleaning Electronics Board with spray cleaner	OK
✓ Cleaning dust inside Unit	OK
✓ Cleaning dust filter	OK

5. Safety Interlock

Description	Status
✓ Door switch	OK
✓ RF Water Re-circulator	OK
✓ Camera Water Re-circulator	OK
✓ Camera purge gas	OK
✓ Argon pressure	OK
✓ Nitrogen pressure	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท สานักงาน เทคโนโลยี 1992 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7

6. Hardware Check with SALSA EXE Diagnostics

Power Supply	Value	Status
-12 VDC (11 - 14.5 VDC)	-13.77 V	OK
+12 VDC (11 - 14.5 VDC)	12.01 V	OK
+3.3 VDC	3.28 V	OK
+5.0 VDC	4.99 V	OK
+13.5 VDC	13.46 V	OK
Plasma Generator	Value	Status
ICP Current 0.500A = 1kW	0.50 A	OK
ICP Ref 5.0Vdc = 1kW	5.41 V	OK
ICP Current 0.00 Vdc = 0kW	0	OK
ICP Ref 0.00Vdc = 0kW	0	OK
RF Water (Hz) OFF	0	OK
RF Water (Hz) ON	0	OK
Air Knife Pres. (0.00V) OFF	0	OK
Air Knife Pres. (3.0 - 7.0 V) ON	3.67 V	OK
Neb 25 @ setting of 25 PSI	2.5	OK
Cool 18 @ setting of 18 LPM	1.8	OK
Aux 0.6 @ setting of .6 LPM	0.6	OK
Camera Water pump	Value	Status
Pump Current (0.000 A) OFF	0	OK
Pump Voltage (0.000 V) OFF	0	OK
Pump Current (0.8 to 4.0A) ON	1.0 A	OK
Pump Voltage (8 to 13 V) ON	12.5 V	OK
Set Points	Value	Status
Air In Set Point 32°C	32	OK
Cam Tee Temperature -32°C	-32	OK
Op Purge Low 0.77 LPM	0.77	OK
Op Purge High 15.50 LPM	15.5	OK
Cam Wtr T 28°C	28.02	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท สยามฟาร์ม จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

7. Min Check for performance Test

	Condition for performance Test	Condition Test	Status
Standard	1 ppm, 5 ppm, 10 ppm	10 ppm	ok
Power plasma	1.20 kw	1.2	ok
Plasma gas	16.0 LPM	16	ok
Auxiliary Gas	0.8 LPM	0.8	ok
Nebulizer	1.2 LPM	25 psi	ok
Pump Speed	25 RPM	25	ok
Integration time	15 s Axial, 5 s Radial	10 s, 5 s	ok
Nebulizer Type	Seaspray, Conical, Meinhard	Conical	ok
Intensity first performance	1 ppm ≥ 4,000,000 5 ppm ≥ 15,000,000 10 ppm ≥ 50,000,000	64,343,926	ok

UV/VIS SPECTROPHOTOMETER

Model : UV – 1800

Serial No. : A11635101643CD



Bara Scientific Co., Ltd.
968 U Chu Liang Building Floor7 Rama4 Road
Silom Bangkok Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375496-7
www.barascientific.com



Certificate of Calibration

Number of Page(s) 1 of 3

Certificate No. BSCC-UV-152/21
Equipment UV/Vis Spectrophotometer
Model UV-1800
Manufacturer Shimadzu
Serial No. A11635101643CD
ID No. LABE 03/2
Date of receipt 24 May 2021
Date of calibration 24 May 2021
Date of issue 1 June 2021
Customer name Eastern Thai Consulting 1992 Co., Ltd.
Address 683 Moo 11, Sukkaphibarn 8 Rd., Nongkham, Siracha, Chonburi 20230

Temperature (20.1-22.2) °C (On site)
Humidity (43.9-49.2) %RH (On site)

Equipment condition Good Operation

Calibration Location Analysis Department

Calibration Procedure In-house method WI-UV-702-01 based on ASTM E275-01

Traceability
Wavelength Accuracy is traceable to certificate No. 87839 and 87844
Photometric Accuracy is traceable to certificate No. 87846 and 87877
Stray Light is traceable to certificate No. 87825
The above certificate are traceable to SI unit through Starna Scientific Ltd.
(UKAS accredited calibration laboratory NO. 0659)

Calibrated by

Approved by

The above results are valid exclusively for the calibrated item(s) as mention in this report
Advertising the report / Certificate and publicity of the results are prohibited and also shall not
except in full, without written approval of the Bara Scientific Co., Ltd.



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968 U Chu Liang Building Floor7 Rama4 Road
Silom Bangkok Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375496-7
www.barascientific.com



Certificate of Calibration

Number of Page(s) 2 of 3

Certificate No. BSCC-UV-152/21

Calibration Results:

1. Wavelength Accuracy

Certified Wavelength (nm)	UUC (nm)	Error (nm)	Uncertainty (±nm)
287.71	287.70	-0.01	0.18
445.82	445.85	0.03	0.18
536.52	536.45	-0.07	0.18
741.02	741.05	0.03	0.18
879.41	879.35	-0.06	0.18

2. Photometric Accuracy (UV)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (±A)
235	0.0000	0.0000	0.0000	0.0075
	0.7174	0.7178	0.0004	0.0075
257	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
313	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
350	0.0000	0.0000	0.0000	0.0075
	0.6202	0.6214	0.0012	0.0075

*CNR = Customer not request

The above results are valid exclusively for the calibrated item(s) as mention in this report
Advertising the report / Certificate and publicity of the results are prohibited and also shall not be
except in full, without written approval of the Bara Scientific Co., Ltd.



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Bara Scientific
Sole agent of Thailand

Certificate of Calibration

Certificate No. BSCC-UV-152/21 Number of Page(s) 3 of 3

Calibration Results:

3. Photometric Accuracy (Visible)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (±A)
420.0	0.0000	0.0000	0.0000	0.0042
	0.5631	0.5615	-0.0016	0.0042
	0.7390	0.7376	-0.0014	0.0042
	1.0863	1.0846	-0.0017	0.0042
440.0	0.0000	0.0000	0.0000	0.0042
	0.5524	0.5501	-0.0023	0.0042
	0.7217	0.7199	-0.0018	0.0042
	1.0606	1.0587	-0.0019	0.0042
465.0	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
546.1	0.0000	0.0000	0.0000	0.0042
	0.5147	0.5124	-0.0023	0.0042
	0.6743	0.6720	-0.0023	0.0042
	0.9909	0.9882	-0.0027	0.0042
590.0	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
635.0	0.0000	0.0000	0.0000	0.0042
	0.5268	0.5271	0.0003	0.0042
	0.6720	0.6708	-0.0012	0.0042
	0.9864	0.9854	-0.0010	0.0042

*CNR = Customer not request

4. Stray Light*

Standard cut-off wavelength (nm)	Unit Under Calibration(UUC)	
	Wavelength (nm)	Absorbance (A)
200.86±0.11nm	201.05	2.0123

The Stray light transmission reference is less than 1.0%T and Stray light absorbance reference is greater than 2.00A

**Stray Light not NSC-ONSC Accredited.

The measurement uncertainty is base on a standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95%.

End of Certificate

The above results are valid exclusively for the calibrated item(s) as mention in this report. Advertising the report / Certificate and publicity of the results are prohibited and also shall not be used except in full, without written approval of the Bara Scientific Co., Ltd.

DoseBadge Reader

Serial No. : 48669

CERTIFICATE OF CALIBRATION

ISSUED BY
Cirrus Research plc

DATE OF ISSUE
11/11/21

CERTIFICATE NUMBER
165782



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 2

Test engineer:
Nigel Smith
Electronically signed

doseBadge Reader

Instrument
Manufacturer: Cirrus Research plc
Model Number: RC:110A

Serial Number: 48669
Notes: Viridian Environmental Service Co., Ltd.
149/119 Moo 2, Krung Non-
Chong Thanom Rd.,
Mahasarak, Bang Krui,
Nonthaburi 11130 Thailand

Calibration Procedure

The tests were carried out in accordance with the requirements of IEC 60942:2003 where applicable.

Date of Calibration: 10 November 2021

Functionality Results

Function	Result
Keypad	Pass
Battery Power	Pass
Display	Pass
Communication	Pass
2 way IR link	Pass
Clock	Pass

Calibration Results

	Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
Initial	113.80	995.3	0.28
Adjusted	114.00	995.3	0.28
Uncertainty	± 0.11	± 0.14	± 0.10
Tolerances	± 0.60	± 2.00	± 4.00

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

ISSUED BY
Cirrus Research plc

DATE OF ISSUE
11/11/21

CERTIFICATE NUMBER
165782



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 2 of 2

Test engineer:
Nigel Smith
Electronically signed

doseBadge Reader

Environmental Conditions

Pressure: 101.50 kPa
Temperature: 23.8 °C
Humidity: 49.7 %

Notes

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Dose Meter

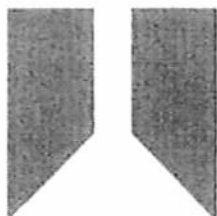
Serial No. : CA3248

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **11/11/21**

CERTIFICATE NUMBER **165784**



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 1

Dosimeter

Instrument information

Manufacturer: **Cirrus Research plc**

Model: **CR:110A**

Serial number: **CA3248**

Firmware version: **504**

Notes: **Viridian Environmental Service Co., Ltd.**
149/119 Moo 2, Krung Non-Chong Thanom Rd.
Mahasawat, Bang Krui, Nonthaburi 11130 Thailand

Test summary

Date of calibration: **11/11/21**

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

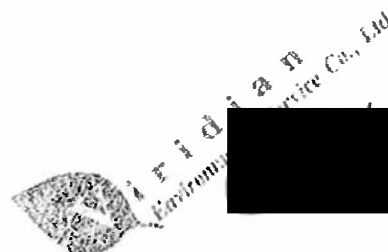
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1 2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1 2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	TTi	TGA1241	257310
Multimeter	Fluke	8845A	1520023
Multimeter	Fluke	8845A	2490007

Notes



This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%.

Dose Meter

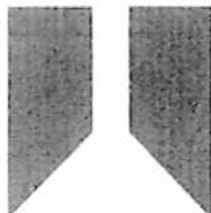
Serial No. : CA3249

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 11/11/21

CERTIFICATE NUMBER 165783



Cirrus Research plc
Acoustic House
Bridlington Road
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YO14 0PH
United Kingdom

Page 1 of 1

Dosimeter

Instrument information

Manufacturer: Cirrus Research plc

Model: CR:110A

Serial number: CA3249

Firmware version: 504

Notes: Viridian Environmental Service Co., Ltd.
149/119 Moo 2, Krung Non-Chong Thanom Rd.,
Mahasawat, Bang Krui, Nonthaburi 11130 Thailand

Test summary

Date of calibration: 11/11/21

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1 2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1 2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	TTi	TGA1241	257310
Multimeter	Fluke	8845A	1520023
Multimeter	Fluke	8845A	2490007

Notes



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Dose Meter

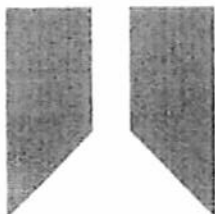
Serial No. : CA3251

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **11/11/21**

CERTIFICATE NUMBER **165787**



Cirrus Research plc
Acoustic House
Bridlington Road
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North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 1

Dosemeter

Instrument information

Manufacturer: **Cirrus Research plc**

Model: **CR:110A**

Serial number: **CA3251**

Firmware version: **502**

Notes: **Viridian Environmental Service Co., Ltd.**
149/119 Moo 2, Krung Non-Chong Thanom Rd.
Mahasawat, Bang Krui, Nonthaburi 11130 Thailand

Test summary

Date of calibration: **11/11/21**

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1 2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1 2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	TTi	TGA1241	257310
Multimeter	Fluke	8845A	1520023
Multimeter	Fluke	8845A	2490007

Notes



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Dose Meter

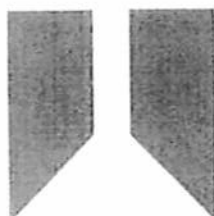
Serial No. : CA3252

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **11/11/21**

CERTIFICATE NUMBER **165786**



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 1

Dosimeter

Instrument information

Manufacturer: **Cirrus Research plc**

Model: **CR:110A**

Serial number: **CA3252**

Firmware version: **504**

Notes: **Viridian Environmental Service Co., Ltd.**
149/119 Moo 2, Krung Non-Chong Phanom Rd.,
Mahasawat, Bang Krui, Nonthaburi 11130 Thailand

Test summary

Date of calibration: **11/11/21**

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	TTi	TGA1241	257310
Multimeter	Fluke	8845A	1520023
Multimeter	Fluke	8845A	2490007

Notes



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Dose Meter

Serial No. : CB0631

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 14/01/22

CERTIFICATE NUMBER 168437



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 1

Dosemeter

Instrument information

Manufacturer: Cirrus Research plc
Model: CR:110A
Serial number: CB0631
Firmware version: 504

Notes: Viridian Environmental Service Co., Ltd.
149/119 Moo 2, Krung Non-Chong Thanom Rd.
Mahasawat, Bang Kruay, Nonthaburi 11130 Thailand

Test summary

Date of calibration: 14/01/22

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1 2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1 2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Multimeter	Fluke	8845A	2490007
Signal Generator	TTi	TGA1241	419342
Multimeter	Fluke	8845A	9440020

Notes



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Dose Meter

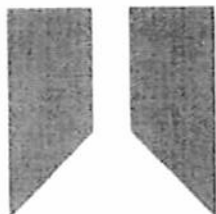
Serial No. : CB0632

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 14/01/22

CERTIFICATE NUMBER 168447



Cirrus Research plc
Acoustic House
Bridlington Road
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YO14 0PH
United Kingdom

Page 1 of 1

Dosimeter

Instrument information

Manufacturer: Cirrus Research plc

Model: CR:110A

Serial number: CB0632

Firmware version: 504

Notes: Viridian Environmental Service Co., Ltd.
149/119 Moo 2, Krung Non-Chong Thanom Rd.
Mahasawat, Bang Krui, Nonthaburi 11130 Thailand

Test summary

Date of calibration: 14/01/22

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000

Test equipment

Equipment	Manufacturer	Model	Serial number
Multimeter	Fluke	8845A	9440020
Multimeter	Fluke	8845A	2490007
Signal Generator	TTi	TGA1241	419342

Notes



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Dose Meter

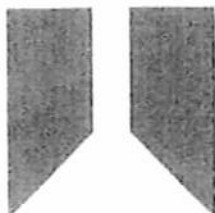
Serial No. : CB0633

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **14/01/22**

CERTIFICATE NUMBER **168452**



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Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 1

Dosemeter

Instrument information

Manufacturer: **Cirrus Research plc**

Model: **CR.110A**

Serial number: **CB0633**

Firmware version: **504**

Notes: **Viridian Environmental Service Co. Ltd.**
149/119 Moo 2, Krung Non-Chong Thanom Rd.
Mahasawat, Bang Krui, Nonthaburi 11130 Thailand

Test summary

Date of calibration: **14/01/22**

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Multimeter	Fluke	8845A	2490007
Signal Generator	TTi	TGA1241	419342
Multimeter	Fluke	8845A	9440020

Notes



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Dose Meter

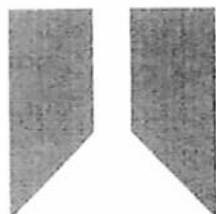
Serial No. : CB0634

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **14/01/22**

CERTIFICATE NUMBER **168434**



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 1

Dosemeter

Instrument information

Manufacturer: **Cirrus Research plc**
Model: **CR:110A**
Serial number: **CB0634**
Firmware version: **504**

Notes: **Viridian Environmental Service Co., Ltd.**
149/119 Moo 2, Krung Non-Chong Thanom Rd.
Mahasawat, Bang Krui, Nonthaburi 11130 Thailand

Test summary

Date of calibration: **14/01/22**

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1 2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1 2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Multimeter	Fluke	8845A	9440020
Multimeter	Fluke	8845A	2490007
Signal Generator	TTi	TGA1241	419342

Notes

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Dose Meter

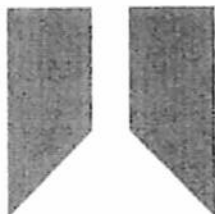
Serial No. : CB0635

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **14/01/22**

CERTIFICATE NUMBER **168448**



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 1

Dosimeter

Instrument information

Manufacturer: **Cirrus Research plc**

Model: **CR:110A**

Serial number: **CB0635**

Firmware version: **504**

Notes: **Viridian Environmental Service Co.,Ltd.**
149/119 Moo 2, Krung Non-Chong Thanom Rd.,
Mahasawat, Bang Kruiy, Nonthaburi 11130 Thailand

Test summary

Date of calibration: **14/01/22**

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1 2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1 2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Multimeter	Fluke	8845A	9440020
Multimeter	Fluke	8845A	2490007
Signal Generator	TTi	TGA1241	419342

Notes



This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%.

Dose Meter

Serial No. : CB0451

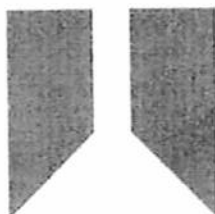
CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 14/01/22

CERTIFICATE NUMBER 168439

Page 1 of 1



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Dosemeter

Instrument information

Manufacturer: Cirrus Research plc

Model: CR:110A

Serial number: CB0451

Firmware version: 504

Notes: Viridian Environmental Service Co., Ltd.
149/119 Moo 2, Krung Non-Chong Thanom Rd.
Mahasawat, Bang Krui, Nonthaburi 11130 Thailand

Test summary

Date of calibration: 14/01/22

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	TTi	TGA1241	419342
Multimeter	Fluke	8845A	2490007
Multimeter	Fluke	8845A	9440020

Notes



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Dose Meter

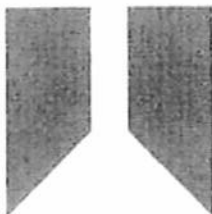
Serial No. : CB0452

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **14/01/22**

CERTIFICATE NUMBER **168443**



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 1

Dosemeter

Instrument information

Manufacturer: **Cirrus Research plc**

Model: **CR110A**

Serial number: **CB0452**

Firmware version: **504**

Notes: **Viridian Environmental Service Co., Ltd.**
149/119 Moo 2, Krung Non-Chong Thanom Rd.
Mahasawat, Bang Krui, Nonthaburi 11130 Thailand

Test summary

Date of calibration: **14/01/22**

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	TTi	TGA1241	419342
Multimeter	Fluke	8845A	2490007
Multimeter	Fluke	8845A	9440020

Notes



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Dose Meter

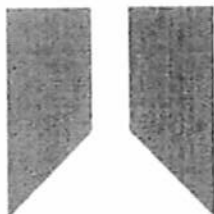
Serial No. : CB0453

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 14/01/22

CERTIFICATE NUMBER 168435



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 1

Dosemeter

Instrument information

Manufacturer: Cirrus Research plc

Model: CR:110A

Serial number: CB0453

Firmware version: 504

Notes: Viridian Environmental Service Co., Ltd.
149/119 Moo 2, Krung Non-Chong Thanom Rd.
Mahasawat, Bang Krui, Nonthaburi 11130 Thailand

Test summary

Date of calibration: 14/01/22

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1 2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1 2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Multimeter	Fluke	8845A	2490007
Multimeter	Fluke	8845A	9440020
Signal Generator	TTI	TGA1241	419342

Notes

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Dose Meter

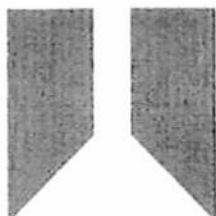
Serial No. : CB0454

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **14/01/22**

CERTIFICATE NUMBER **168436**



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 1

Dosemeter

Instrument information

Manufacturer: **Cirrus Research plc**

Model: **CR:110A**

Serial number: **CB0454**

Firmware version: **504**

Notes: **Viridian Environmental Service Co., Ltd.**
149/119 Moo 2, Krung Non-Chong Thanom Rd.
Mahasawat, Bang Krui, Nonthaburi 11130 Thailand

Test summary

Date of calibration: **14/01/22**

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1 2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1 2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Multimeter	Fluke	8845A	2490007
Signal Generator	TTi	TGA1241	419342
Multimeter	Fluke	8845A	9440020

Notes



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Dose Meter

Serial No. : CB0455

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **14/01/22**

CERTIFICATE NUMBER **168444**



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 1

Dosemeter

Instrument information

Manufacturer: **Cirrus Research plc**

Model: **CR:110A**

Serial number: **CB0455**

Firmware version: **504**

Notes: **Viridian Environmental Service Co.,Ltd.**
149/119 Moo 2, Krung Non-Chong Thanom Rd.
Mahasawat, Bang Krui, Nonthaburi 11130 Thailand

Test summary

Date of calibration: **14/01/22**

The calibration was performed respecting the requirements of ISO/IEC 17025 2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1 2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1 2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Multimeter	Fluke	8845A	9440020
Multimeter	Fluke	8845A	2490007
Signal Generator	TTi	TGA1241	419342

Notes



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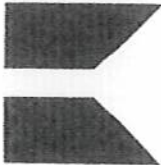
NOISE DOSI METER

MODEL : CR:110A

SERIAL No. : CA8879

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc
DATE OF ISSUE 14/01/22 CERTIFICATE NUMBER 188428



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 1

Dosemeter

Instrument information

Manufacturer: Cirrus Research plc Notes: Eastern Thal Consulting 1992 Co.,Ltd. 683 Moo 11
Model: CR:110A Sukaphibal 8 Rd., Nongkham, Sriracha, Chonburi
Serial number: CA8879 20230
Firmware version: 504

Test summary

Date of calibration: 14/01/22
The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.
The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Multimeter	Fluke	8845A	2490007
Signal Generator	TTi	TGA1241	419342
Multimeter	Fluke	8845A	9440020

Notes

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NOISE DOSI METER

MODEL : CR:110A

SERIAL No. : CA8888

CERTIFICATE OF CALIBRATION

ISSUED BY

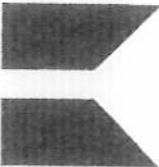
Cirrus Research plc

DATE OF ISSUE

14/01/22

CERTIFICATE NUMBER

168425



Cirrus Research plc

Acoustic House

Bridlington Road


Hunmanby

North Yorkshire

YO14 0PH

United Kingdom

Page 1 of 1



Dosimeter

Instrument information		
Manufacturer:	Cirrus Research plc	Notes: Eastern Thal Consulting 1992 Co.,Ltd. 683 Moo 11 Sukaphibal 8 Rd., Nongkham, Sriracha, Chonburi 20230
Model:	CR-110A	
Serial number:	CA8888	
Firmware version:	504	

Test summary

Date of calibration: 14/01/22


The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment		
Equipment	Manufacturer	Model
Signal Generator	TTI	TGA1241
Multimeter	Fluke	8845A
Multimeter	Fluke	8845A
		Serial number
		419342
		2490007
		8440020

Notes



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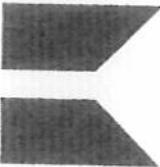
NOISE DOSI METER

MODEL : CR:110A

SERIAL No. : CA8889

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc
DATE OF ISSUE 14/01/22
CERTIFICATE NUMBER 168429



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Dosemeter

Instrument information

Manufacturer: Cirrus Research plc
Model: CR:110A
Serial number: CA8889
Firmware version: 504
Notes: Eastern Thai Consulting 1992 Co., Ltd. 683 Moo 11
Sukaphibal 8 Rd., Nongkham, Sriracha, Chonburi
20230

Test summary

Date of calibration: 14/01/22
The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.
The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Multimeter	Fluke	8845A	9440020
Signal Generator	TTI	TGA1241	419342
Multimeter	Fluke	8845A	2490007

Notes

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NOISE DOSI METER

MODEL : CR:110A

SERIAL No. : CB0640

CERTIFICATE OF CALIBRATION

ISSUED BY


Cirrus Research plc

DATE OF ISSUE

14/01/22


CERTIFICATE NUMBER

168431



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 1



Dosemeter

Instrument Information

Manufacturer:

Cirrus Research plc

Model:

CR-110A

Serial number:

CB0640

Firmware version:

504

Notes:

Eastern Thai Consulting 1992 Co.,Ltd. 883 Moo 11
Sukaphibal 8 Rd., Nongkham, Sriracha, Chonburi 2

Test summary

Date of calibration:

14/01/22

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.


The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Multimeter	Fluke	8845A	9440020
Signal Generator	TTi	TGA1241	419342
Multimeter	Fluke	8845A	2490007

Notes



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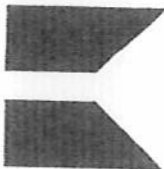
NOISE DOSI METER

MODEL : CR:110A

SERIAL No. : CB0641

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc
DATE OF ISSUE 14/01/22 CERTIFICATE NUMBER 168446



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

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Dosimeter

Instrument Information

Manufacturer: Cirrus Research plc Notes: Eastern Thai Consulting 1992 Co.,Ltd. 683 Moo 11
Model: CR-110A Sukaphibal 8 Rd., Nongkham, Sriracha, Chonburi
Serial number: CB0641 20230
Firmware version: 504

Test summary

Date of calibration: 14/01/22
The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.
The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Multimeter	Fluke	8845A	2490007
Signal Generator	TTi	TGA1241	419342
Multimeter	Fluke	8845A	9440020

Notes



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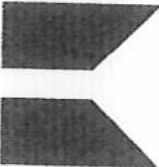
NOISE DOSI METER

MODEL : CR:110A

SERIAL No. : CB0644

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc
DATE OF ISSUE 14/01/22 CERTIFICATE NUMBER 168440



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

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Dosemeter

Instrument Information

Manufacturer: Cirrus Research plc Notes: Eastern Thal Consulting 1992 Co.,Ltd. 683 Moo 11
Model: CR:110A Sukaphibal 8 Rd., Nongkham, Sriracha, Chonburi
Serial number: CB0644 20230
Firmware version: 504

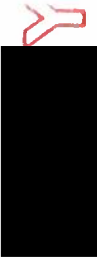
Test summary

Date of calibration: 14/01/22
The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.
The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	TTI	TGA1241	419342
Multimeter	Fluke	8845A	9440020
Multimeter	Fluke	8845A	2490007

Notes



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DoseBadge Reader

Serial No. : 87366

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 14/01/22

CERTIFICATE NUMBER 168424

Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 2

doseBadge Reader

Instrument

Manufacturer: Cirrus Research plc
Model Number: RC:110A

Serial Number: 87366

Notes: Eastern Thai Consulting 1992
Co.,Ltd. 683 Moo 11
Sukaphibal 8 Rd., Nongkham,
Sriracha, Chonburi
20230

Calibration Procedure

The tests were carried out in accordance with the requirements of IEC 60942:2003 where applicable.

Date of Calibration: 14 January 2022

Functionality Results

Function	Result
Keypad	Pass
Battery Power	Pass
Display	Pass
Communication	Pass
2 way IR link	Pass
Clock	Pass

Calibration Results

	Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
Initial	114.20	1000.4	0.15
Adjusted	114.00	1000.4	0.15
Uncertainty	± 0.11	± 0.14	± 0.10
Tolerances	± 0.60	± 2.00	± 4.00

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CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 14/01/22

CERTIFICATE NUMBER 168424

Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 2 of 2

doseBadge Reader

Environmental Conditions

Pressure: 102.70 kPa
Temperature: 22.0 °C
Humidity: 34.3 %

Notes

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NOISE DOSI METER

MODEL : CR:110A

SERIAL No. : CB0958

ISSUED BY **Cirrus Research plc**
DATE OF ISSUE **14/01/22**
CERTIFICATE NUMBER **168438**

Page 1 of 1

Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Instrument Information

Manufacturer: Cirrus Research plc
Model: CR-110A
Serial number: CB0958
Firmware version: 504

Notes: Eastern Thai Consulting 1992 Co., Ltd. 683 Moo 11
Sukaphibal 8 Rd., Nongkham, Sriracha, Chonburi
20230

Date of calibration: 14/01/22

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Equipment	Manufacturer	Model	Serial number
Multimeter	Fluke	8845A	9440020
Signal Generator	TTI	TGA1241	419342
Multimeter	Fluke	8845A	2490007

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%.

NOISE DOSI METER

MODEL : CR:110A

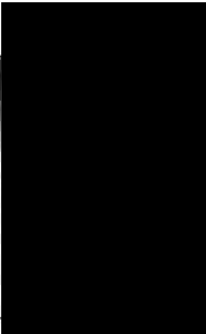
SERIAL No. : CB0954

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc
DATE OF ISSUE 14/01/22 CERTIFICATE NUMBER 168445



Cirrus Research plc
Acoustic House
Bridlington Road
Hummanby
North Yorkshire
YO14 0PH
United Kingdom



Dosimeter

Instrument Information

Manufacturer: Cirrus Research plc Notes: Eastern Thai Consulting 1992 Co., Ltd. 683 Moo 11
Model: CR:110A Sukaphibal 8 Rd., Nongkham, Sriracha, Chonburi
Serial number: CB0954 20230
Firmware version: 504

Test summary

Date of calibration: 14/01/22
The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.
The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Multimeter	Fluke	8845A	9440020
Multimeter	Fluke	8845A	2490007
Signal Generator	TTI	TGA1241	419342

Notes



This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

NOISE DOSI METER

MODEL : CR:110A

SERIAL No. : CB0956

ISSUED BY	Cirrus Research plc
DATE OF ISSUE	12/11/21
CERTIFICATE NUMBER	165841

Page 1 of 1

Instrument information

Test summary

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	TTi	TGA1241	257310
Multimeter	Fluke	8845A	1520023
Multimeter	Fluke	8845A	2490007

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NOISE DOSI METER

MODEL : CR:110A

SERIAL No. : CB0644

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc
DATE OF ISSUE 14/01/22 CERTIFICATE NUMBER 168440



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 1

Dosimeter

Instrument Information

Manufacturer: Cirrus Research plc Notes: Eastern Thai Consulting 1992 Co.,Ltd. 683 Moo 11
Model: CR:110A Sukaphibal 8 Rd., Nongkham, Sriracha, Chonburi
Serial number: CB0644 20230
Firmware version: 504

Test summary

Date of calibration: 14/01/22
The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.
The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	TTi	TGA1241	419342
Multimeter	Fluke	8845A	9440020
Multimeter	Fluke	8845A	2490007

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%.