

ภาคผนวก จ

เอกสารสอบเทียบเครื่องมือฯ

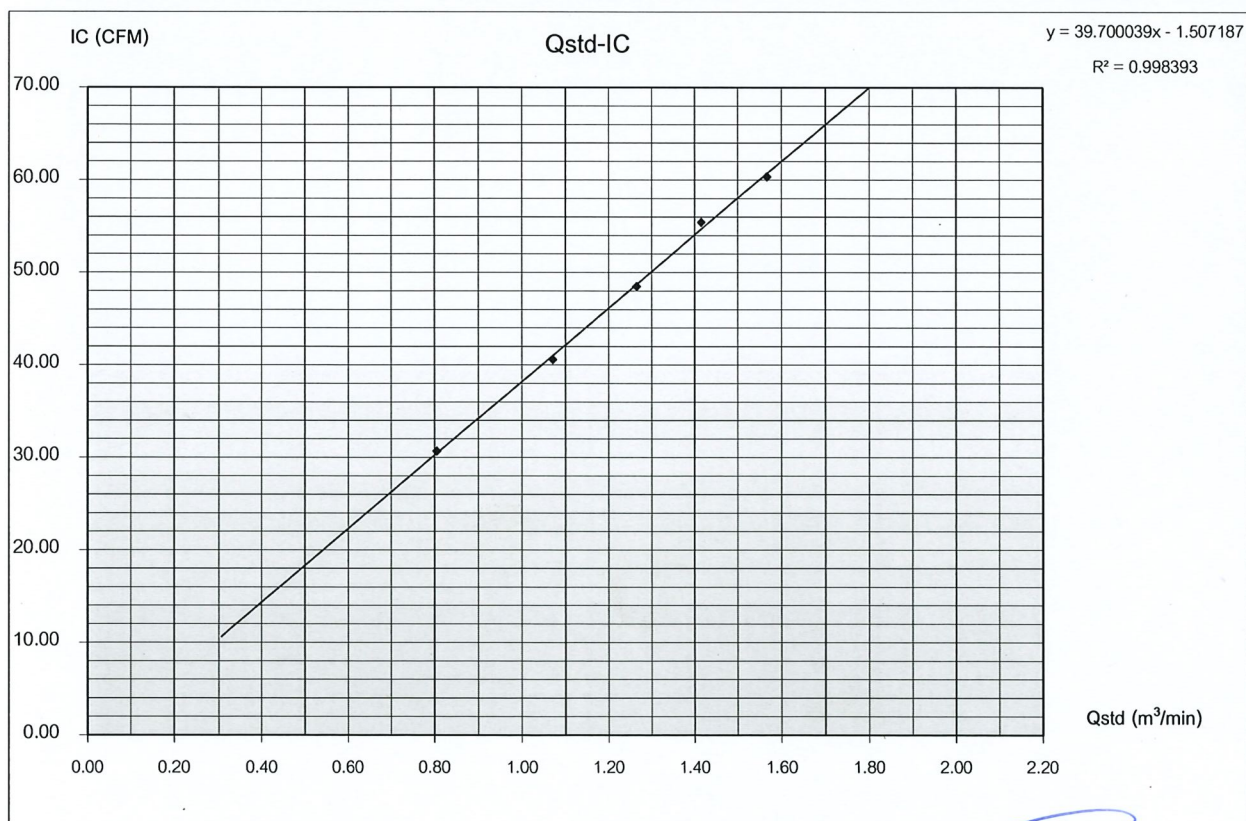
TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Sampler Location				Date	October 3, 2022
A1 : บริเวณชุมชนบ้านหนองลำ หมูที่ 8				Start Time	11:34 AM
Sampler Number	TSP No.A8	Transfer Standard Type	Orifice	Stop Time	11:44 AM
Instrument Model	HIVOL-BBCBE	Calibrator Model	TE-5025A	Calibrated By	Mr.Somprasong Thetsakun
Motor Serial Number	11452	Calibrator Serial Number	3882		
Recorder Serial Number	90				

Plate No.	(Delta H)			(A)	(X)	(I)	(Y)	Temperature	Barometric Pressure	Start Meter	Stop Meter
	Pressure Drop Across Orifice (inH ₂ O)			[ΔH ₂ O(Pa/P _{std})(T _{std} /Ta)] ^{1/2}	Qstd = (1/m)[(A-b)] (m ³ /min)	sample Flow Rate Indication (ft ³ /min)	IC = I[(Pa/P _{std})(T _{std} /Ta)] ^{1/2}	(*K = °C+273)	(mmHg)		
	Positive	Negative	ΔH ₂ O								
5	1.4	1.4	2.8	1.65618	0.80544	31.0	30.68	303.0	757.0		
7	2.5	2.5	5.0	2.21316	1.07104	41.0	40.58	303.0	757.0		
10	3.5	3.5	7.0	2.61865	1.26439	49.0	48.50	303.0	757.0		
13	4.4	4.4	8.8	2.93609	1.41577	56.0	55.43	303.0	757.0		
18	5.4	5.4	10.8	3.25267	1.56673	61.0	60.38	303.0	757.0		
Linear Regression Y ON X : Y= mX + b							Average	303.0	757.0		
1	Slope (m)			2.09709	Linear Equation			r ²	0.998393	Pstd(mmHg)	760.0
2	Intercept (b)			-0.03290	Set Point Flow Rate (X) (m ³ /min)		1.133	r	0.9991962	T _{NTP}	298.0
3	Correlation Coefficient (r)			0.99997	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.97961612	
Result								C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.989755586	

COMMENT

Andersen Instruments, Inc.



Checked By

(Mr. Prayun Detkla)
Technician



Approved By

(Mr. Panupon Podang)
Environmental Scientist

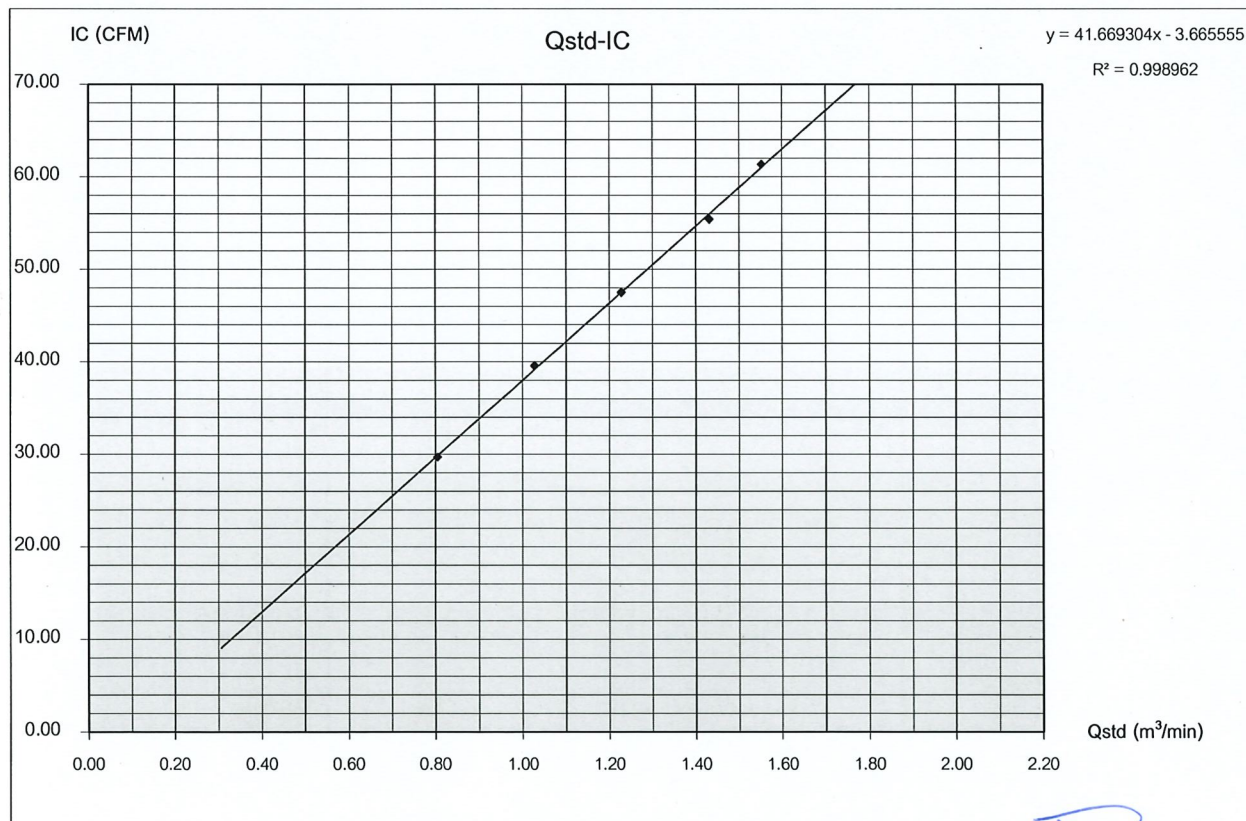
PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Sampler Location				Date	October 3, 2022
A1 : บริเวณชุมชนบ้านหนองคล้า หมู่ที่ 8				Start Time	11:23 AM
Sampler Number	PM-10 No.6	Transfer Standard Type	Orifice	Stop Time	11:33 AM
Instrument Model	HIVOL-BMBBE	Calibrator Model	TE-5025A	Calibrated By	Mr.Somprasong Thetsakun
Motor Serial Number	4642	Calibrator Serial Number	3882		
Recorder Serial Number	6				

Plate No.	(Delta H)			(A)	(X)	(I)	(Y)	Temperature	Barometric	Start	Stop
	Pressure Drop Across Orifice (inH ₂ O)			$[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	Qstd = (1/m)[(A-b)] (m ³ /min)	ample Flow Rate Indicato (ft ³ /min)	IC = I[(Pa/P _{std})(T _{std} /Ta)] ^{1/2}	(*K = °C+273)	Pressure (mmHg)	Meter	Meter
	Positive	Negative	ΔH ₂ O								
5	1.4	1.4	2.8	1.65618	0.80544	30.0	29.69	303.0	757.0		
7	2.3	2.3	4.6	2.12279	1.02794	40.0	39.59	303.0	757.0		
10	3.3	3.3	6.6	2.54273	1.22819	48.0	47.51	303.0	757.0		
13	4.5	4.5	9.0	2.96927	1.43159	56.0	55.43	303.0	757.0		
18	5.3	5.3	10.6	3.22241	1.55230	62.0	61.36	303.0	757.0		
Linear Regression Y ON X : Y= mX + b							Average	303.0	757.0		
1	Slope (m)			2.09709	Linear Equation			r ²	0.998962	Pstd(mmHg)	760.0
2	Intercept (b)			-0.03290	Set Point Flow Rate (X) (m ³ /min)		1.133	r	0.9994809	T _{NTP}	298.0
3	Correlation Coefficient (r)			0.99997	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)			0.97961612
Result								C=(Pa/Pstd)*(Tstd/Ta)^0.5			0.989755586

COMMENT

Andersen Instruments, Inc.



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Environmental Scientist

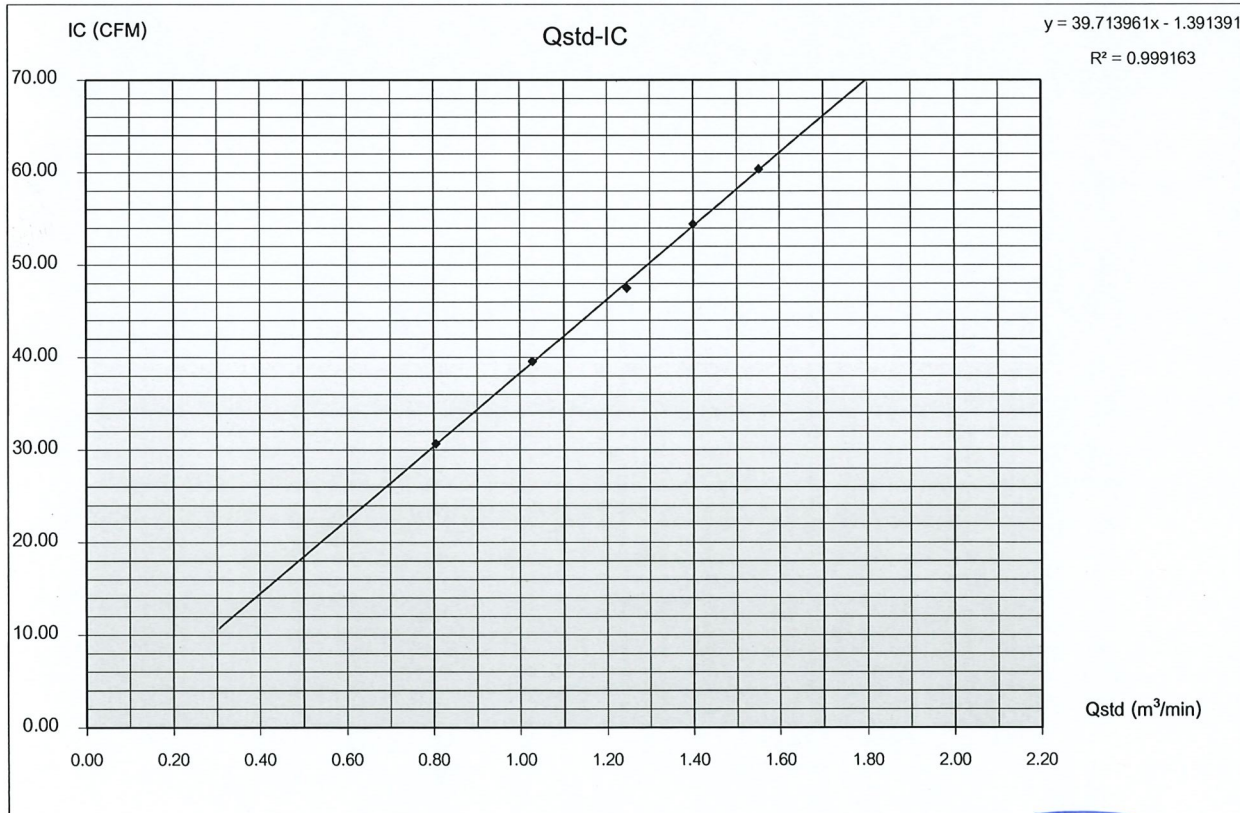
TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Sampler Location				Date	October 3, 2022
A2 : บริเวณวัดเขาโพธิ์ หมู่ที่ 10				Start Time	12:35 PM
Sampler Number	TSP No.A16	Transfer Standard Type	Orifice	Stop Time	12:45 PM
Instrument Model	HIVOL-BBCBE	Calibrator Model	TE-5025A	Calibrated By	Mr.Somprasong Thetsakun
Motor Serial Number	7363	Calibrator Serial Number	3882		
Recorder Serial Number	2214				

Plate No.	(Delta H)			(A)	(X)	(I)	(Y)	Temperature	Barometric	Start	Stop
	Pressure Drop Across Orifice (inH ₂ O)			$[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	Qstd = (1/m)[(A-b)] (m ³ /min)	ample Flow Rate Indicato (ft ³ /min)	IC = I[(Pa/P _{std})(T _{std} /Ta)] ^{1/2}	(*K = °C+273)	Pressure (mmHg)	Meter	Meter
	Positive	Negative	ΔH ₂ O								
5	1.4	1.4	2.8	1.65618	0.80544	31.0	30.68	303.0	757.0		
7	2.3	2.3	4.6	2.12279	1.02794	40.0	39.59	303.0	757.0		
10	3.4	3.4	6.8	2.58097	1.24643	48.0	47.51	303.0	757.0		
13	4.3	4.3	8.6	2.90253	1.39976	55.0	54.44	303.0	757.0		
18	5.3	5.3	10.6	3.22241	1.55230	61.0	60.38	303.0	757.0		
Linear Regression Y ON X : Y= mX + b							Average	303.0	757.0		
1	Slope (m)			2.09709	Linear Equation			r ²	0.999163	Pstd(mmHg)	760.0
2	Intercept (b)			-0.03290	Set Point Flow Rate (X) (m ³ /min)		1.133	r	0.9995814	T _{NTP}	298.0
3	Correlation Coefficient (r)			0.99997	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)			0.97961612
Result								C=(Pa/Pstd)*(Tstd/Ta)^0.5			0.989755586

COMMENT

Andersen Instruments, Inc.



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(Mr. Prayun Detkla)
Technician

Approved By

(Mr. Panupon Podang)
Environmental Scientist

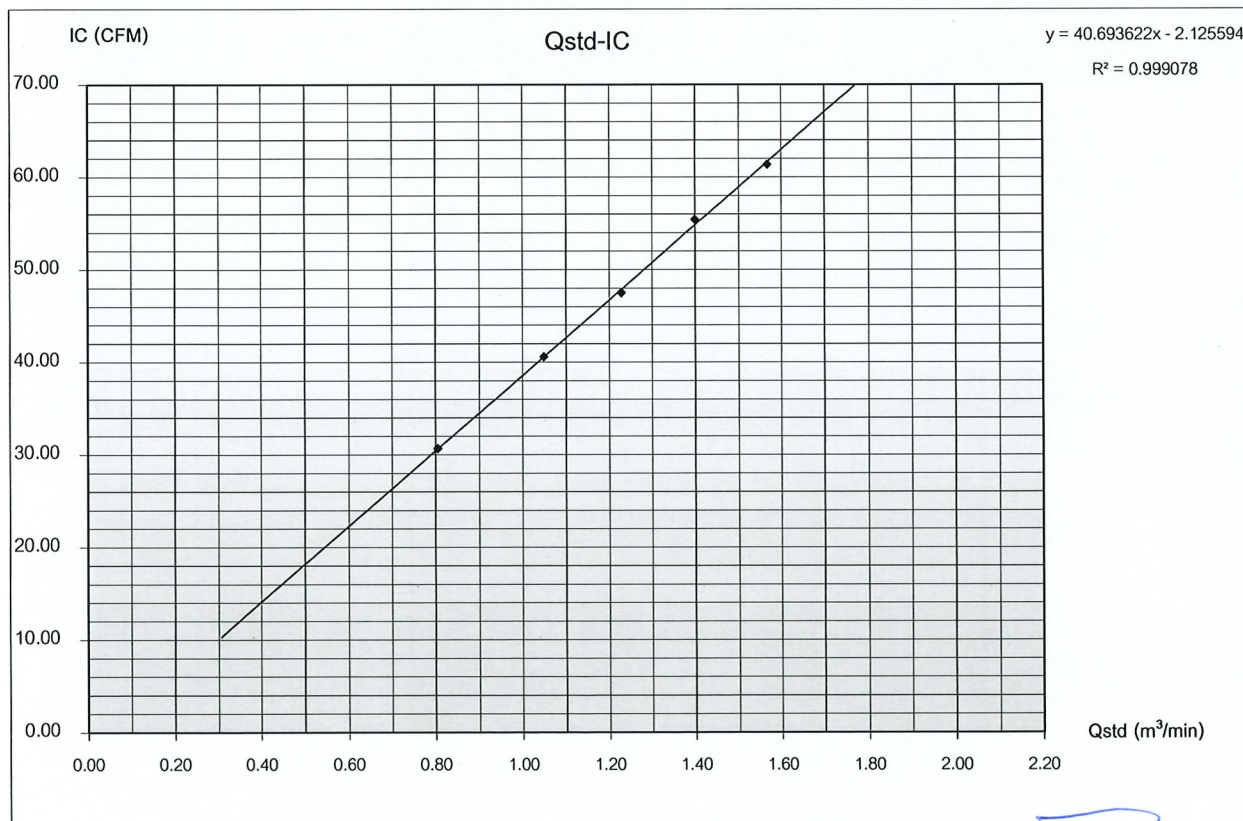
PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Sampler Location				Date	October 3, 2022
A2 : บริเวณวัดเขาโพธิ์ หมู่ที่ 10				Start Time	12:46 PM
Sampler Number	PM-10 No.3	Transfer Standard Type	Orifice	Stop Time	12:56 PM
Instrument Model	HIVOL-BMBBE	Calibrator Model	TE-5025A	Calibrated By	Mr.Somprasong Thetsakun
Motor Serial Number	7351	Calibrator Serial Number	3882		
Recorder Serial Number	A9				

Plate	(Delta H)			(A)	(X)	(I)	(Y)	Temperature	Barometric	Start	Stop
No.	Pressure Drop Across Orifice (inH ₂ O)			[ΔH ₂ O(Pa/P _{std})(T _{std} /Ta)] ^{1/2}	Qstd = (1/m)[(A-b)] (m ³ /min)	ample Flow Rate Indication (ft ³ /min)	IC = I[(Pa/P _{std})(T _{std} /Ta)] ^{1/2}	(*K = °C+273)	Pressure (mmHg)	Meter	Meter
	Positive	Negative	ΔH ₂ O								
5	1.4	1.4	2.8	1.65618	0.80544	31.0	30.68	303.0	757.0		
7	2.4	2.4	4.8	2.16845	1.04971	41.0	40.58	303.0	757.0		
10	3.3	3.3	6.6	2.54273	1.22819	48.0	47.51	303.0	757.0		
13	4.3	4.3	8.6	2.90253	1.39976	56.0	55.43	303.0	757.0		
18	5.4	5.4	10.8	3.25267	1.56673	62.0	61.36	303.0	757.0		
Linear Regression Y ON X : Y= mX + b							Average	303.0	757.0		
1	Slope (m)			2.09709	Linear Equation			r ²	0.999078	Pstd(mmHg)	760.0
2	Intercept (b)			-0.03290	Set Point Flow Rate (X) (m ³ /min)		1.133	r	0.9995389	T _{NTP}	298.0
3	Correlation Coefficient (r)			0.99997	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.97961612	
Result								C=(Pa/Pstd)*(Tstd/Ta)*0.5		0.989755586	

COMMENT

Andersen Instruments, Inc.



Checked By

(Mr. Prayun Detkla)
Technician

Approved By

(Mr. Panupon Podang)
Environmental Scientist

Certificate of Calibration

Calibration Certification Information

Cal. Date: May 2, 2022 Roots-meter S/N: 438320 Ta: 295 °K
 Operator: Jim Tisch Pa: 751.6 mm Hg
 Calibration Model #: TE-5025A Calibrator S/N: 3882

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4440	3.2	2.00
2	3	4	1	1.0200	6.4	4.00
3	5	6	1	0.9130	8.0	5.00
4	7	8	1	0.8730	8.8	5.50
5	9	10	1	0.7200	12.8	8.00

Data Tabulation

Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)}$ (y-axis)
0.9947	0.6889	1.4135	0.9957	0.6896	0.8860
0.9905	0.9711	1.9990	0.9915	0.9720	1.2530
0.9884	1.0825	2.2349	0.9894	1.0836	1.4009
0.9873	1.1309	2.3440	0.9883	1.1321	1.4693
0.9820	1.3639	2.8270	0.9830	1.3652	1.7720
QSTD	m=	2.09709	QA	m=	1.31316
	b=	-0.03290		b=	-0.02062
	r=	0.99997		r=	0.99997

Calculations

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

Standard Conditions

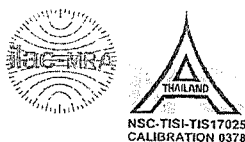
Tstd:	298.15 °K
Pstd:	760 mm Hg
Key	
ΔH:	calibrator manometer reading (in H2O)
ΔP:	rootsmeter manometer reading (mm Hg)
Ta:	actual absolute temperature (°K)
Pa:	actual barometric pressure (mm Hg)
b:	intercept
m:	slope

RECALIBRATION

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



PLAY SOLUTION TECHNOLOGY COMPANY LIMITED
179/75 Nawong Pracha Pattana Road, Sikan, Donmuang, Bangkok 10210
Tel.:+66 2 011 0505, Fax:+66 2 010 7700
www.playsotec.com



CERTIFICATE OF CALIBRATION

Customer _____ Certificate no. PST-0001-22
Page no. 1 of 3

Company : ENVIRONMENT RESEARCH & TECHNOLOGY CO.,LTD.
Address : 25/114 Moo 6 Soi Chinaket 1, Ngamwongwan Road, Toongsonghong,
City / Province : Laksi, Bangkok
Zip/Postal : 10210

Device

Equipment : Electronic Balance Capacity : 220 g
Manufacturer : METTLER TOLEDO Readability : 0.0001 g
Model : AB204-S ID No. : ERTC-L-In-0048
Serial No. : 1123103723

Environment Conditions

Location of Calibration : Calibration Laboratory at Play Solution Technology Co.,Ltd
Ambient Temperature : 25.9 (°C)
Relative Humidity : 53.1 (%RH)
Barometric Pressure : 1011.5 (mba)
Calibration Procedure : This Calibration was conducted by using In-House calibration procedure number CP-M-001 base on "UKAS LAB 14"
Comment :

Date of Receipt : January 4, 2022

Date of Calibration : January 4, 2022

Issue Date : January 4, 2022

Calibrated by : Kittichai R.
(Kittichai Rattanatham)
Calibrator

Approved by : K. R.
(Kittichai Rattanatham)
Approved Signature

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

This Certificate is issued in accordance with the conditions of accreditation granted by Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and is traceability to recognize national standards and to the unit of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval prior written approval of the calibration center, Play Solution Technology Co.,Ltd



PLAY SOLUTION TECHNOLOGY COMPANY LIMITED
179/75 Nawong Pracha Pattana Road, Sikan, Donmuang, Bangkok 10210
Tel.:+66 2 011 0505, Fax:+66 2 010 7700
www.playsotec.com



CERTIFICATE OF CALIBRATION

Result of Calibration : Without Adjustment Certificate no. PST-0001-22
Page no. 2 of 3

1. Repeatability

Weighing Rang 1	(g)	Normal Value	(g)	Standard Deviation	(g)
Max.capacity	220	200		0.00005	

Weighing Rang 2	(g)	Normal Value	(g)	Standard Deviation	(g)
Max.capacity					

2.Linearity, Departure of Indication from nominal value

Normal Value	Standard Value	Indication	Error of Indication	Expanded Uncertainty	Factor k
(g)	(g)	(g)	(g)	(g)	
0.001	0.00100	0.0010	0.0000	0.00011	2.07
0.01	0.01000	0.0100	0.0000	0.00011	2.07
0.1	0.10001	0.1000	0.0000	0.00011	2.07
1	1.00001	1.0000	0.0000	0.00011	2.06
5	5.00002	5.0000	0.0000	0.00011	2.06
10	10.00001	10.0000	0.0000	0.00011	2.05
50	50.00003	50.0000	0.0000	0.00013	2.03
100	100.00004	100.0001	0.0001	0.00018	2.00
150	150.00007	150.0001	0.0000	0.00024	2.00
200	200.00006	200.0002	0.0001	0.00031	2.00

Weighing Range 2

Normal Value	Standard Value	Indication	Error of Indication	Expanded Uncertainty	Factor k
(g)	(g)	(g)	(g)	(g)	

The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by cover factor k , as per listed in table above, which corresponds to a confidence level of about 95%

CERTIFICATE OF CALIBRATION

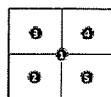
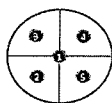
Result of Calibration

Certificate no. PST-0001-22

Page no. 3 of 3

3.Eccentricity

Test load at least 1/3 of the maximum capacity, typically placed between 1/2 and 1/3 of the distance from the centre of the load receptor to the edge.



Weighing Range 1

Test Load : 100 (g)

Position	Indication (g)
1	100.0001
2	100.0001
3	100.0002
4	100.0001
5	100.0002
Max.Deviation	0.0001

Weighing Range 2

Test Load : (g)

Position	Indication (g)
Max.Deviation	

Standard methode

The calibration was performed by using calibration laboratory's in-house calibration methode : CP-M-001 based on "UKAS LAB 14 : Calibration of weighing machine" : edition 6 | October 2019

Reference standards instrument

Instrument	OIML Class	S/N	Certificate No.	Due Date
Standard Weight Set	E2	4000021952	MM-0183-20	December 8, 2022
Standard Weight Set	-	-	-	-
Standard Weight Set	-	-	-	-
Standard Weight Set	-	-	-	-

Measurement Uncertainty

The given measurement uncertainty is the standard of the measurement multiplied by an extension factor k which corresponds to a confidence level of about 95% for a normal distribution. The standard uncertainty was calculated according to M3003

Traceability : The measurement is traceable to national standard, which realize the physical unit of measurement (SI)

- National institute of Metrology (Thailand) through Calibration Laboratory

END OF REPORT



THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 12 April, 2022

Certification No. 161/22

Page : 1 of 3

Object : Weather Station

Manufacturer : Davis Instruments Inc.

Type : Vantage Pro 2 ID No. : No.22

Serial No. : Display AS160105011 Transmitter BE181108006

Customer : Environment Research & Technology Company Limited.
25/113-114 Moo 6 Soi Chinaket 1, Ngamwongwan Road,
Toongsonghong, Laksi, Bangkok 10210.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1008.1 hPa

NATIONAL STANDARD WIND TUNNEL :

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119

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

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)

Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No.8389/94

: Thermoschneider No.918802

Calibrated by : *Watchapol* Signed : *[Signature]*

Mr. Watchapol Subwat

Mechanical Engineer

Mr. Pisod Promsut

(Authorised Signatory)

for the Chief

Sub-Standard Instrument



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 161/22

12 April, 2022

Page : 2 of 3

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H2O	Vacuum inches H2O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	3.1	-0.08
5.00	-	-	-	4.9	0.10
7.04	-	-	-	7.2	-0.16
9.02	-	-	-	8.9	0.12
11.01	-	-	-	11.2	-0.19
13.01	-	-	-	13.0	0.01
15.01	-	-	-	14.8	0.21
17.02	-	-	-	17.0	0.02
20.02	-	-	-	19.8	0.22

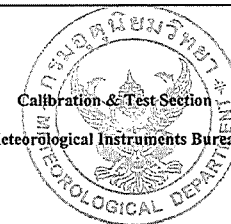
Wind Aloft Plotting Board.	
U.S. DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :

Watchapol

Mr. Watchapol Subwat

Mechanical Engineer





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 0-2396-0156,0-2399-0469

The Result of Calibration

Certification No. 161/22

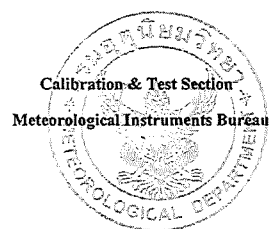
12 April, 2022

Page : 3 of 3

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
50.6	50.6	0.0
30.2	30.3	-0.1
15.4	15.4	0.0

Checked by :

Mr. Watcharapol Subwat
Mechanical Engineer





THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 9 February, 2022

Certification No. 041/22

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard II Product No. 7425

Serial No. : MC70909A08 ID No. : No.19

Customer : Environment Research & Technology Company Limited.
25/113-114 Moo 6 Soi Chinaket 1, Ngamwongwan Road,
Toongsonghong, Laksi, Bangkok 10210.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1011.2 hPa

NATIONAL STANDARD WIND TUNNEL :

: Thermal Anemometer 642 S/N 91563

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

N.I.S.T. Test Reference Number 731/241460

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)

Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION

Calibrated by :

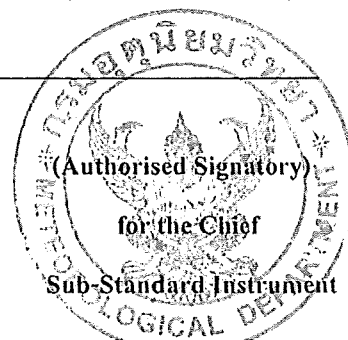
Wacharapong

Signed :

Mr. Pisood Promsut

Mr. Wacharapol Subwat

Mechanical Engineer





THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 041/22

9 February, 2022

Page : 2 of 2

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H ₂ O	Vacuum inches H ₂ O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.9	0.10
7.04	-	-	-	6.7	0.34
9.02	-	-	-	8.9	0.12
11.01	-	-	-	10.7	0.31
13.01	-	-	-	13.0	0.01
15.01	-	-	-	14.8	0.21
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.1	-0.08

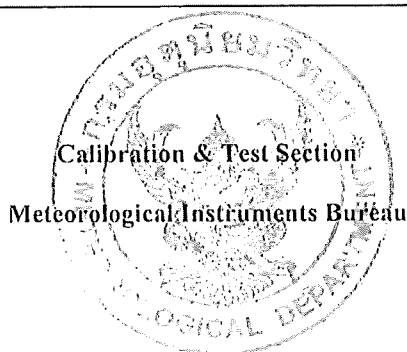
Wind Aloft Plotting Board.	
US. DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :

Watchapol

Mr. Watchapol Subwat

Mechanical Engineer



Support Equipment Type	: Sound Level Calibrator
Manufacture	: Larson Davis
Model	: CAL200
Serial No.	: 3606
Range of Calibrator	
- Sound Pressure Level	: 93.5 dB.
- Frequency	: 1,000 Hz.
Calibrated By	: Mr.Akarawat Kochabog
Calibration Date	: October 3, 2022
Customer Name	: บริษัท โฟรท์เียร์ คอนซัลแตนต์ จำกัด: โครงการโรงไฟฟ้าเอ็กโก โคเจน (ส่วนขยาย ครั้งที่ 1)

[illegible]

Prayun

Mr. Prayun Detkla
Technician

envi research
Approved By
ENVIRONMENT RESEARCH & TECHNOLOGY CO., LTD.

Ms.Sutatip Im-noi
Environmental Scientist



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-65/0605

MTC No. EEL. BP. 98/0665

CALIBRATION CERTIFICATE

Submitted by : Environment Research & Technology Co., Ltd.
Address : 25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Rd., Toongsonghong, Laksi, Bangkok 10210.
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 :	Ambient Environment
Description : Precision Acoustic Calibrator	Temperature : (23 ± 3) °C
Manufacturer : Larson Davis	Relative Humidity : (50 ± 15) %
Model : CAL200	Ambient Pressure : (101.325 ± 1.500) kPa
Serial No. : 3606	

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 Panasonic VP-7722A S/N 041477D122.
7. Condenser Microphone Bruel&Kjaer 4180 S/N 2633526.

Calibration Procedure: CP-102-04 based on IEC 60942:2003. The sound pressure level of instrument was 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 : 29 Jun. 2022

Date of Calibration : 5 Jul. 2022

1 / 3

H. M. K.

The results relate only to the items tested/calibrated or value assigned.
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FM.BLMTC.002 Rev.4

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Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

Office
196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-65/0605

MTC No. EEL. BP. 98/0665

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 IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer4180	93.50	-0.50	± 0.10	± 0.40 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer4180	1000.4	0.4	± 1.5	± 1.0 %

3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer4180	1.83	± 0.50	± 3.0 %

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was included at the level of 0.26 dB from manual.

Date of Calibration : 5 Jul. 2022

2 / 3

H. M. K.

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FM.BLMTC.002 Rev.4

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



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-65/0605

MTC No. EEL. BP. 98/0665

Nominal Output of Unit Under Test = 114 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 IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	113.53	-0.47	± 0.10	± 0.40 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	1000.4	0.4	± 1.5	± 1.0 %

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	0.64	± 0.50	± 3.0 %

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was included at the level of 0.26 dB from manual.

Calibrated by :

N. Nuttapong
(Mr.Nuttapong Niljrusvanit)

Tawkiat
(Mr.Tawikiat Iamsamran)

Approved by :



Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 5 Jul. 2022

Date of Issue : 6 Jul. 2022

Ref : 2011265062902932003

3 / 3

End of Certificate

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert.No.: 22CH13
Page.: 1 of 3

Certificate of Calibration

Equipment : pH Meter
Manufacturer : Eutech
Model : pHTestr 30
Serial No. : 3011826
ID No. : NO.23
Condition As-Received: Used Item
Received Date : 29 December 2021
Calibration Date : 05 January 2022
Reference : 2112-0752WN-9
Submitted by : Environment Research & Technology Company Limited.
25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Road,
Toongsonghong, Laksi, Bangkok 10210
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In - house method :
- CP-CH5 by direct measurement with standard
voltage calibrator and direct measurement with
certified reference material (CRM)
- CP-CH8 by comparison with standard thermometer

Calibrated by : Walalak Sirithean

Approved by : 
Approved Signatory

(/) Malee Butkruea
() Saithip Meangmai
() Warakorn Lernagatrakul

Issue Date : 7 January 2022

The Uncertainties are for a confidence probability of approximately 95%

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



Cert.No.: 22CH13
Page.: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument : -

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Ref. Standard Thermometer	4982054	110RC044	2111201	26 Oct 2022

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

- Traceable to National Institute of Metrology (Thailand), NIMT

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

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	761016	02 Aug 2023
pH 6.982	CPA chem	761017	02 Aug 2022
pH 10.015	CPA chem	761018	02 Aug 2022

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

Calibration Results

Function : pH Measurement

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (±)	Coverage factor k
pH Electrode	4.008	4.00	N/A	0.0085	2.05
S/N.: 3011826	6.982	6.97	N/A	0.011	2.00
	10.015	10.02	N/A	0.0096	2.00

Remark - pH meter does not have voltage mode.
- Can not connect the BNC because the plug does not match with the socket.
- N/A = Not Available



Cert.No.: 22CH13

Page.: 3 of 3

Calibration Results

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : -
- Serial No. : 3011826

Dimension of probe;

- Length : 36 mm.
- Diameter : 6 mm.
- Immersion Depth : 33 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor <i>k</i>
25.0	24.998	25.3	0.302	0.13	2.00
30.0	29.998	30.3	0.302	0.13	2.00
35.0	35.002	35.3	0.298	0.13	2.00

Remark : - UUC* = Unit Under Calibration

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

-o0o-

Mali.



CRYSTAL CALIBRATION SALES AND SERVICE CO., LTD.

45/48 Soi Salathammassop31, Salathammassop Rd.,

Salathammassop, Thawewatthana, Bangkok 10170 Thailand

Tel : 0-2408-8474-5 Fax : 0-2408-8477 Email : info@crystalcal.com www.crystalcal.com



CERTIFICATE OF CALIBRATION

Issue Date : 28 December 2021

Certificate No. : 21-1224-004

Work Order No. : 21/1224

Customer Name : Environment research & Technogy Co., Ltd.
25/114 Moo6 Soi Chinaket1, Ngamwongwan Road,
Toongsonghong, Lakki, Bangkok 10210

Date of Received : 15 December 2021

Date of Calibration : 15 December 2021

Instrument Details : Description : Temperature Controlled Enclosures (Incubator)
Manufacturer : Accuplus
Model : Smart i250
Serial No. : 2059-0218-0002
ID No. : ERTC-L-IN-143
Resolution : 0.1 °C
Location : Laboratory

Calibration Method : This instrument was calibrated by insert standard thermometer into the chamber according to calibration procedure no. CWI-T-10 follow up to TLAS G-20-1/02-08 (E) : Guidelines for Calibration and Checks of Temperature Controlled Enclosures.

Environmental Conditions :

Temperature : Area Monitoring between 15°C to 40°C
Humidity : Area Monitoring between 30%RH to 85%RH
Line Voltage : Area Monitoring 220 VAC ± 10%

Traceability of Measurement :

This certificate of calibration documents the traceability to national standard, which realize the unit of measurement according to the International system of Units (SI) and The temperature scale in use at this laboratory is The International Temperature scale of 1990.

Calibrated by : Mr. Sitthisak Tonglim
Calibration Engineer

Approved by :
(Mr. Anuwat Yaklermjit)
Laboratory Manager

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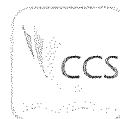
Crystal Calibration Sales and Service Co., Ltd.

45/48 Salathammassop 31, Salathammassop Rd., Salathammassop, Thawewatthana, Bangkok 10170

Phone : 0-2408-8474 Fax : 0-2408-8477 http://www.crystalcal.com Email : info@crystalcal.com



PAGE 1/3
1b-1-65



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Salathammassop, Thawewatthana, Bangkok 10170 Thailand

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CERTIFICATE OF CALIBRATION

Issue Date : 28 December 2021

Certificate No. : 21-1224-004

Work Order No. : 21/1224

Details of Calibration

1. Reference Standards Instrument

Instrument	Model	Serial No./Ins No.	Certificate No.	Due Date
Data Acquisition unit	34972A	MY57006241	21-719-014	03 September 2022
Sensor type	RTD	RTD# 101-109	21-719-014	03 September 2022

2. Certificate traceable

: This certificate traceable to The International System of Unit refer to
Crystal Calibration Sales and Service Co., Ltd. , NAC Calibration No. 0260

3. Condition of item

: Used

4. Calibration site

: On - Site

5. Result of Calibration

: Without adjustment

6. Evaluate Condition

: Time Constant : - Hour 50 Minute At cal. point 20 °C
Air vent : Off
Fan speed status : Fixed Fan Speed

7. Calibration note

: The results reported in this certificate refer to the condition of instrument on
the process into the steady state of chamber

8. Sensors Installation Diagram

: When ; Sensor installation location in Chamber @ Working Space
A = Distance between sensor and wall of chamber is 5 cm

9. Dimensions of chamber

: W = 0.5 m ; D = 0.5 m ; H = 0.9 m

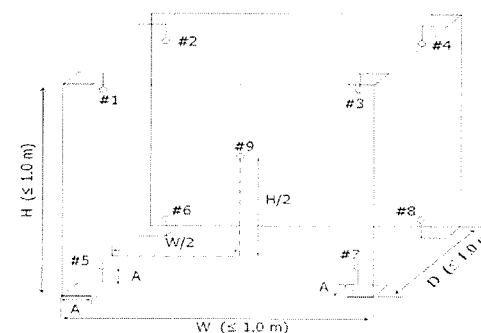


Diagram of Chamber

1b-1-65 PAGE 2/3



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CERTIFICATE OF CALIBRATION

Certificate No. : 21-1224-004

Issue Date : 28 December 2021

Work Order No. : 21/1224

Result of Temperature Distribution and Performance Check

Table1 : Reporting of Temperature Distribution

Calibration point (°C)	Average Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF)									Uncertainty ± (°C)
	#1	#2	#3	#4	#5	#6	#7	#8	#9	
20.0	20.26	20.08	20.22	20.11	20.18	20.12	20.09	20.16	19.91	0.60

Table 2 : Reporting of Performance check

Indicator Set Point (°C)	Indicator Reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
	MAX	MIN	Average			
20.0	20.0	19.6	19.9	0.39	0.58	1.03

Note

Customer would like to find internal temperature in chamber and this report customer request and accepted in certificate

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

The measured temperature data readout by software "Benchlink Datalogger 3"

The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity) "

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

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

Overall Variation - The difference of the maximum and minimum measured temperatures throughout observation time.

Indicating Temperature - the average reading of indicating device that forms the integral part of the enclosure.

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

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



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Cert.No.: 22TW15

Page.: 1 of 2

Certificate of Testing

Equipment : DO Meter
Manufacturer : YSI
Model : 5000-115V
Serial No. : 03C1280 AC
ID No. : ERTC-L-In-021
Received Date : 19 January 2022
Test Date : 21 January 2022
Reference : 2201-0594WN-1
Submitted by : Environment Research & Technology Company Limited.
25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Road,
Toongsonghong, Laksi, Bangkok 10210
Laboratory Condition : Temperature (25 ± 5) °C
Humidity (50 ± 20) %
Test Procedure : In - house method : CP-CH9
by Comparison Technique with Azide Modification Method
Tested by : Walalak Sirithean

Approved by :

Approved Signatory

- (/) Malee Butkruea
() Saithip Meangmai
() Warakorn Lerngagtrakul

Issue Date : 1 February 2022

23-2-65

B 0279633



Cert.No.: 22TW15

Page.: 2 of 2

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No.: 07H100306

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.16	8.15	0.0071

This report was certified only for the instrument we tested. It is allowable to use for study the system efficiency, The environmental impact control and present to organization it may concerned. Intend to use for advertising and referral purpose is prohibited. This report may not be reproduced other in full, without written approval of the laboratory

-o0o-


Maku.
[Signature]
23-2-65
a 1091839

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



Accuracy Calibration Certificate

Customer

Company: ENVIRONMENT RESEARCH&TECHNOLOGY CO., LTD.
Address: 25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Rd., Toongsongho
City: Laksi Contact: Ramila Taengthai
Zip / Postal: 10210
State / Province: Bangkok
Order Number: 

Weighing Device

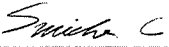

Manufacturer: Mettler Toledo Instrument Type: Weighing Instrument
Model: MS204TS/00 Asset Number: ERTC-LIN-114
Serial No.: B547728937 Terminal Model: N/A
Building: N/A Terminal Serial No.: N/A
Floor: 5 Terminal Asset No.: N/A
Room: 504

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

Procedure

Calibration Guidelines: EURAMET cg-18 v. 4.0 (11/2015)
METTLER TOLEDO Work Instruction: CPW002/20
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.

	Temperature		Humidity	
As Found	Start: 23.8 °C	End: 24.5 °C	Start: 49.7 %	End: 55.1 %

As Found Calibration Date: 19-Jan-2022 Calibrator: 
As Left Calibration Date: N/A
Issue Date: 20-Jan-2022 Approved Signatory: 

- ☒ Kassakorn Tassanachaisakul
☐ Santi Jitniyom
☐ Surachet Sukkate

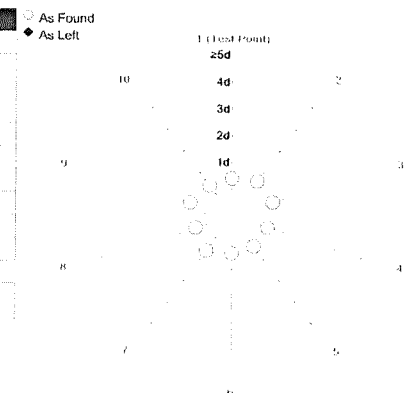
Measurement Results

Repeatability

Test Load: 100 g

	As Found	As Left
1	99.9999 g	N/A
2	99.9998 g	N/A
3	99.9998 g	N/A
4	99.9999 g	N/A
5	99.9999 g	N/A
6	99.9999 g	N/A
7	99.9998 g	N/A
8	99.9999 g	N/A
9	99.9998 g	N/A
10	99.9999 g	N/A

Standard Deviation	0.00005 g	N/A
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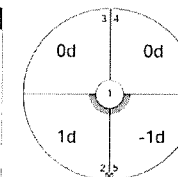
The "d" in the graph represents the readability of the range/interval in which the test was performed.
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	99.9998 g	N/A
2	99.9999 g	N/A
3	99.9998 g	N/A
4	99.9998 g	N/A
5	99.9997 g	N/A

Maximum Deviation	0.0001 g	N/A
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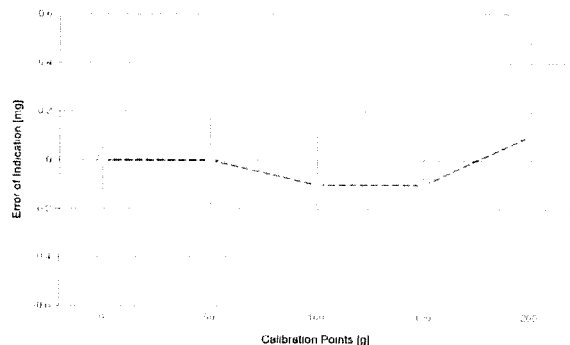
As Found

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	0.0000 g	0.0000 g	0.0000 g	0.12 mg	2
2	0.0500 g	0.0500 g	0.0000 g	0.13 mg	2
3	0.1000 g	0.1000 g	0.0000 g	0.13 mg	2
4	0.5000 g	0.5000 g	0.0000 g	0.13 mg	2
5	1.0000 g	1.0000 g	0.0000 g	0.13 mg	2
6	5.0000 g	5.0000 g	0.0000 g	0.14 mg	2
7	10.0000 g	10.0000 g	0.0000 g	0.14 mg	2
8	50.0000 g	50.0000 g	0.0000 g	0.18 mg	2
9	99.9999 g	99.9998 g	-0.0001 g	0.24 mg	2
10	149.9999 g	149.9998 g	-0.0001 g	0.34 mg	2
11	199.9999 g	200.0000 g	0.0001 g	0.39 mg	2



As Found

As Left

For improved legibility of the graphics only increasing measurement points are shown and measurement points close to zero are not displayed.

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.: WS03 Date of Issue: 21-Sep-2021
Certificate Number: 175498 Calibration Due Date: 14-Mar-2023

Thermo Hygrometer

Equipment No.: IN281 Date of Issue: 25-May-2021
Certificate Number: 21H1100 Calibration Due Date: 10-May-2022

26-1-65

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.

26-1-65

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: $3.0 \cdot 10^{-6} / K$

Temperature range on site for the evaluation of the measurement uncertainty in use: 4 K

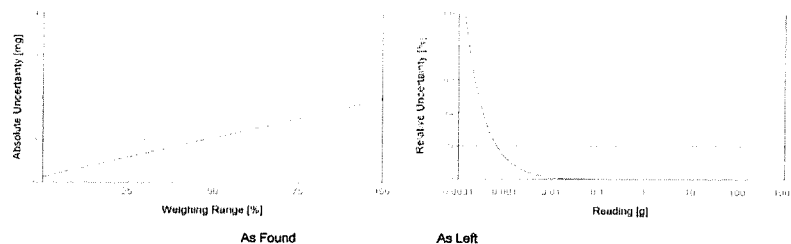
Linearization of Uncertainty Equation

Range			As Found	As Left
d		Max		
1	0.0001 g	220 g	$U_1 = 0.13 \text{ mg} + 0.00828 \text{ mg/g} \cdot R$	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	
0.0220 g	0.13 mg	0.59%	N/A	N/A
0.2200 g	0.13 mg	0.060%	N/A	N/A
2.2000 g	0.15 mg	0.0067%	N/A	N/A
22.0000 g	0.31 mg	0.0014%	N/A	N/A
220.0000 g	2.0 mg	0.00089%	N/A	N/A



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.

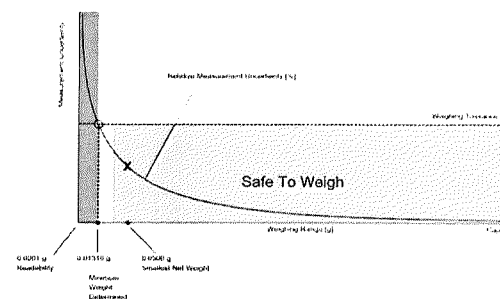
Process Requirements

Weighing Tolerance: 1%

Smallest Net Weight: 0.0500 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.

26-1-65

26-1-65

Minimum Weight

As Found Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.13276 g	0.26775 g	0.40503 g	0.68670 g	1.43539 g
0.2%	0.06610 g	0.13276 g	0.19997 g	0.33610 g	0.68670 g
0.5%	0.02637 g	0.05284 g	0.07939 g	0.13276 g	0.26775 g
1%	0.01318 g	0.02637 g	0.03960 g	0.06610 g	0.13276 g
2%	0.00659 g	0.01318 g	0.01977 g	0.03298 g	0.06610 g
5%	0.00263 g	0.00527 g	0.00790 g	0.01318 g	0.02637 g

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

As Left Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.13276 g	0.26775 g	0.40503 g	0.68670 g	1.43539 g
0.2%	0.06610 g	0.13276 g	0.19997 g	0.33610 g	0.68670 g
0.5%	0.02637 g	0.05284 g	0.07939 g	0.13276 g	0.26775 g
1%	0.01318 g	0.02637 g	0.03960 g	0.06610 g	0.13276 g
2%	0.00659 g	0.01318 g	0.01977 g	0.03298 g	0.06610 g
5%	0.00263 g	0.00527 g	0.00790 g	0.01318 g	0.02637 g

✓ 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			
i _h = Safety Factor not met			

Repeatability

Test Load: 100 g

Tolerance	Control Limit	As Found		As Left	
		Std. Deviation	Result	Std. Deviation	Result
0.1%	N/A		N/A		N/A
0.2%	0.00005 g		✓		✓
0.5%	0.00013 g		✓		✓
1%	0.00025 g	0.00005 g*	✓	0.00005 g*	✓
2%	0.00050 g		✓		✓
5%	0.00125 g		✓		✓

*The calculated standard deviation value is below the rounding error of the balance. The 0.41*d rule is used for the assessment of this repeatability test and the calculation of the minimum weight.

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	
		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.

Error of Indication

As Found

Reference Value	Error	Control limits for various weighing tolerances					
		0.1%	0.2%	0.5%	1%	2%	5%
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A
50.0000 g	0.0000 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g
99.9999 g	-0.0001 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
149.9999 g	-0.0001 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
199.9999 g	0.0001 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

As Left

Reference Value	Error	Control limits for various weighing tolerances					
		0.1%	0.2%	0.5%	1%	2%	5%
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A
50.0000 g	0.0000 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g
99.9999 g	-0.0001 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
149.9999 g	-0.0001 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
199.9999 g	0.0001 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 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.

26-1-65



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL : 0-2717-3009-27 FAX: 0-2719-9484



Cert. No.: 22TM151
Page.: 1 of 3

Certificate of Calibration

Equipment : Hot Air Oven
Manufacturer : Binder
Model : FED 115 E2
Serial No. : 11-22823
ID No. : ERTC-L-In.-076
Submitted by : Environment Research & Technology Company Limited
25/114 Moo 6 Soi Chinaket 1,
Ngamwongwan Road, Toongsonghong, Laksi,
Bangkok 10210
Location : Laboratory (ERTC)
Received Order : 5 January 2022
Calibration Date : 5 January 2022
Ambient Temperature : $(26 \pm 10) ^\circ\text{C}$
Relative Humidity : $(50 \pm 30) \%$

Calibrated by : Man Pattanapongpaiboon

Approved by :
Approved Signatory

() Pornthippa Tameyakul
(✓) Malee Butkruea
() Suwit Imjai

Issue Date : 21 January 2022

The Uncertainties are for a confidence probability of approximately 95%

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

26-1-65

A 0036818



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2201-0006ON-2
Procedure Used :-

Cert. No.: 22TM151

Page.: 2 of 3

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD) and Thermocouple Type T.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34970A	MY44031769	21LM12	02 Sep 2022

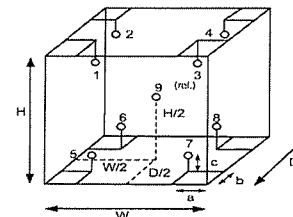
2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close



Probe Installation Details : **Dimension of Chamber :**

a =	5.0	cm	D =	0.40	m
b =	5.0	cm	W =	0.60	m
c =	5.0	cm	H =	0.48	m
			Capacity =	0.12	m ³

Environment during calibration		
	Beginning	Finished
Temp. (°C)	27	27
REL.Humid. (%)	54	58
AC Supply (Volt)	219	222

Ref. Std. ID No.: @ Calibration Point		
Position :	(180) °C	(104) °C
1	20-09TC-01	9RTD-2/1
2	20-09TC-02	9RTD-2/2
3	20-09TC-03	9RTD-2/3
4	20-09TC-04	9RTD-2/4
5	20-09TC-05	9RTD-2/5
6	20-09TC-06	9RTD-2/6
7	20-09TC-07	9RTD-2/7
8	20-09TC-08	9RTD-2/8
9 (ref.)	20-09TC-09	9RTD-2/9

26-1-65

a 1090220



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2201-0006ON-2
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 22TM151
Page.: 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor <i>k</i>
104	104	104	0.11	1.1	1.4	0.69	2
180	180	180	0.43	3.3	5.6	1.5	2

Calibration Point (°C)	Measured Temperature (°C)								
	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
104	103.167	102.948	104.098	104.155	104.013	103.198	103.619	103.294	103.159
180	177.080	177.342	181.816	181.065	179.474	177.914	181.064	179.354	178.751

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

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


Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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

-oOo-


26-1-6

a 1090219

Service Date: 2022-01-19
Document Number: TH2065-164-011922-LABBalanceHR
ENVIRONMENT RESEARCH&TECHNOLOGY CO., LTD
25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Rd., Toongsongha อ.ต๋องสงฆ, Lakul, Bangkok 10210
Ramita Taengthai

METTLER TOLEDO

Balance Health Report

System Details			
Manufacturer:	Mettler Toledo	Accessory 1:	
Model:	MS204TS	Accessory 2:	
Serial number:	B547728937	Weight set for routine testing:	Yes /
Firmware:	3.50		

Device History		Service History	
Instrument in use:	Yes	Last preventive maintenance:	< 1 year
Instrument age:	3-10 years	Last instrument calibration:	< 1 year
Spare parts available:	Yes	Last minimum weight determination:	< 1 year
Regulations:	ISO		
Process tolerance in %:	1%	Routine testing performed:	Yes
Smallest sample net weight:	0.0500 g		

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	✓		
Mechanical Component Checks		Electrical Component Checks	
Draft shield	✓	Power supply	✓
Weighting pan position	✓	Sliding door drive	✓
Housing	✓	Internal weight drive	✓
Other - objections noted as additional remarks	—	Display	✓
Other - objections noted as additional remarks	—	Other - objections noted as additional remarks	—

Measurement Result Quality		Process Efficiency	
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	Name: Ramita Taengthai	Position: N/A	Phone: 0860334490
			Email: ramita@enviressarch.co.th
Additional Remarks & Recommendations		Engineer Details	
		Date:	19-Jan-2022
		Name:	Suwicha Choykamchu
		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

0464 - 846/5 Lasalle Rd., Bangna Tai Sub-District, Bangna District, Bangkok 10260, +66 2723 0382
MT-TH.ServiceSupport@mt.com
www.mt.com

METTLER TOLEDO Service

Report Version: 1.13, Software Version 4.26.2.15, Page 1/1, ©METTLER TOLEDO

26-1-63

Calibration Certificate ID
TH2065-083-011922-ACC-TH

METTLER TOLEDO

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



Accuracy Calibration Certificate

Customer

Company: ENVIRONMENT RESEARCH&TECHNOLOGY CO., LTD.
Address: 25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Rd., Toongsongha
City: Lakul Contact: Ramita Taengthai
Zip / Postal: 10210
State / Province: Bangkok
Order Number:

Weighing Device

Manufacturer: Mettler Toledo Instrument Type: Weighing Instrument
Model: MS204S/01 Asset Number: ERTC-L-IN-068
Serial No.: B334691537 Terminal Model: N/A
Building: N/A Terminal Serial No.: N/A
Floor: 5 Terminal Asset No.: N/A
Room: 504

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

Procedure

Calibration Guideline: EURAMET cg-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 cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

	Temperature		Humidity	
As Found	Start: 23.9 °C	End: 24.2 °C	Start: 45.8 %	End: 54.8 %

As Found Calibration Date: 19-Jan-2022
As Left Calibration Date: N/A
Issue Date: 20-Jan-2022

Calibrator:
Suwicha Choykamchu

Approved Signatory:
☒ Kassakorn Tassanachaisakul
☐ Santi Jitniyom
☐ Surachet Sukkate

Software Version: 1.23.0.229
Report Version: 2.16.8
Form Number: F103C

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Page 1 of 5

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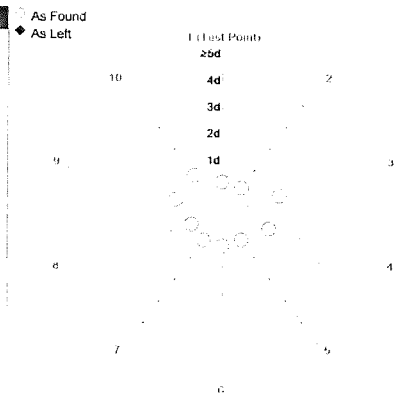
Measurement Results

Repeatability

Test Load: 100 g

	As Found	As Left
1	99.9998 g	N/A
2	99.9998 g	N/A
3	99.9997 g	N/A
4	99.9999 g	N/A
5	99.9998 g	N/A
6	99.9998 g	N/A
7	99.9998 g	N/A
8	99.9998 g	N/A
9	99.9999 g	N/A
10	99.9999 g	N/A

Standard Deviation	0.00006 g	N/A
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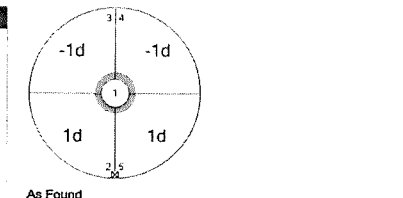
The "d" in the graph represents the readability of the range/interval in which the test was performed.
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	99.9998 g	N/A
2	99.9999 g	N/A
3	99.9997 g	N/A
4	99.9997 g	N/A
5	99.9999 g	N/A

Maximum Deviation	0.0001 g	N/A
-------------------	----------	-----

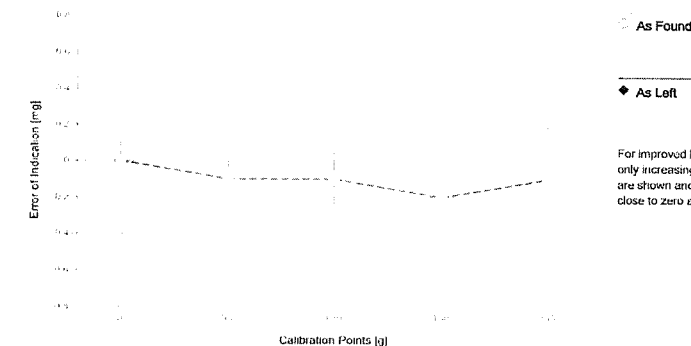


The "d" in the graph represents the readability of the range/interval in which the test was performed.

Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.0000 g	0.0000 g	0.0000 g	0.14 mg	2
2	0.0500 g	0.0500 g	0.0000 g	0.15 mg	2
3	0.1000 g	0.1000 g	0.0000 g	0.15 mg	2
4	0.5000 g	0.5000 g	0.0000 g	0.15 mg	2
5	1.0000 g	1.0000 g	0.0000 g	0.15 mg	2
6	5.0000 g	5.0000 g	0.0000 g	0.16 mg	2
7	10.0000 g	10.0000 g	0.0000 g	0.16 mg	2
8	50.0000 g	49.9999 g	-0.0001 g	0.19 mg	2
9	99.9999 g	99.9998 g	-0.0001 g	0.25 mg	2
10	149.9999 g	149.9997 g	-0.0002 g	0.35 mg	2
11	199.9999 g	199.9998 g	-0.0001 g	0.39 mg	2



For improved legibility of the graphics only increasing measurement points are shown and measurement points close to zero are not displayed.

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.:	WS03	Date of Issue:	21-Sep-2021
Certificate Number:	175498	Calibration Due Date:	14-Mar-2023

Thermo Hygrometer

Equipment No.:	IN281	Date of Issue:	25-May-2021
Certificate Number:	21H1100	Calibration Due Date:	10-May-2022

26-1-65

26-1-65

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: $1.5 \cdot 10^{-6} / K$

Temperature range on site for the evaluation of the measurement uncertainty in use: $4^\circ K$

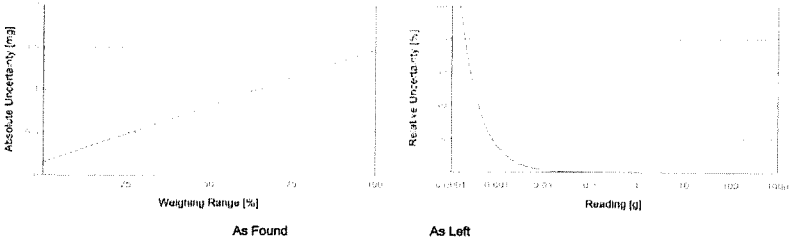
Linearization of Uncertainty Equation

	Range		As Found	As Left
	d	Max		
1	0.0001 g	220 g	$U_1 = 0.15 \text{ mg} + 0.00599 \text{ mg/g} \cdot R$	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	
0.0220 g	0.15 mg	0.68%	N/A	N/A
0.2200 g	0.15 mg	0.069%	N/A	N/A
2.2000 g	0.16 mg	0.0074%	N/A	N/A
22.0000 g	0.28 mg	0.0013%	N/A	N/A
220.0000 g	1.5 mg	0.00067%	N/A	N/A



26-1-65

26-1-65

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.

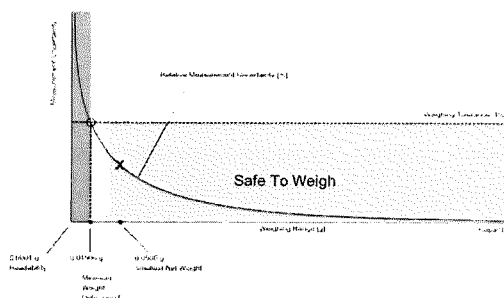
Process Requirements

Weighing Tolerance: 1%

Smallest Net Weight: 0.0500 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.

26-1-65

Minimum Weight

As Found Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.15146 g	0.30476 g	0.45993 g	0.77601 g	1.60147 g
0.2%	0.07550 g	0.15146 g	0.22788 g	0.38211 g	0.77601 g
0.5%	0.03015 g	0.06037 g	0.09066 g	0.15146 g	0.30476 g
1%	0.01506 g	0.03015 g	0.04525 g	0.07550 g	0.15146 g
2%	0.00753 g	0.01506 g	0.02260 g	0.03770 g	0.07550 g
5%	0.00301 g	0.00602 g	0.00904 g	0.01506 g	0.03015 g



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

As Left Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.15146 g	0.30476 g	0.45993 g	0.77601 g	1.60147 g
0.2%	0.07550 g	0.15146 g	0.22788 g	0.38211 g	0.77601 g
0.5%	0.03015 g	0.06037 g	0.09066 g	0.15146 g	0.30476 g
1%	0.01506 g	0.03015 g	0.04525 g	0.07550 g	0.15146 g
2%	0.00753 g	0.01506 g	0.02260 g	0.03770 g	0.07550 g
5%	0.00301 g	0.00602 g	0.00904 g	0.01506 g	0.03015 g



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.

26-1-65

Measurement Results

Results Summary

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

✓ = Passed

✗ = Failed

f_s = Safety Factor not met

Repeatability

Test Load: 100 g

Tolerance	Control Limit	As Found		As Left	
		Std. Deviation	Result	Std. Deviation	Result
0.1%	N/A	0.00006 g*	N/A	0.00006 g*	N/A
0.2%	0.00005 g		✗		✗
0.5%	0.00013 g		✓		✓
1%	0.00025 g		✓		✓
2%	0.00050 g		✓		✓
5%	0.00125 g		✓		✓

*The calculated standard deviation value is below the rounding error of the balance. The 0.41*d rule is used for the assessment of this repeatability test and the calculation of the minimum weight.

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	
		Deviation	Result	Deviation	Result
0.1%	0.0500 g	0.0001 g	✓	0.0001 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.

Error of Indication

As Found

Reference Value	Error	Control limits for various weighing tolerances					
		0.1%	0.2%	0.5%	1%	2%	5%
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A
50.0000 g	-0.0001 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g
99.9999 g	-0.0001 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
149.9999 g	-0.0002 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
199.9999 g	-0.0001 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

As Left

Reference Value	Error	Control limits for various weighing tolerances					
		0.1%	0.2%	0.5%	1%	2%	5%
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A
50.0000 g	-0.0001 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g
99.9999 g	-0.0001 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
149.9999 g	-0.0002 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
199.9999 g	-0.0001 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 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: 2022-01-19
 Document Number: TH2065-105-011922-LABBalanceHR
 ENVIRONMENT RESEARCH&TECHNOLOGY CO., LTD
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 Ramita Taengthai

METTLER TOLEDO

Balance Health Report

Device Details

System Details			
Manufacturer:	Mettler Toledo	Accessory 1:	
Model:	MS204S	Accessory 2:	
Serial number:	B334601637	Weight set for routine testing:	Yes /
Firmware:	1.74		

History

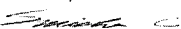
Device History		Service History	
Instrument in use:	Yes	Last preventive maintenance:	< 1 year
Instrument age:	> 10 years	Last instrument calibration:	< 1 year
Spare parts available:	Yes	Last minimum weight determination:	
Regulations:	ISO		
Process tolerance in %:	1%	Routine testing performed:	Yes
Smallest sample net weight:	0.05g		

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	✓		
Mechanical Component Checks		Electrical Component Checks	
Draft shield	✓	Power supply	✓
Weighing pan position	✓	Sliding door drive	—
Housing	✓	Internal weight drive	✓
Other - objections noted as additional remarks	—	Display	✓
		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		Replace / add parts (see additional remarks)	
Preventive maintenance		Onsite repair	
Perform routine testing with test weights		Dopot repair	
User training		Use of accessories (see additional remarks)	

Contact	Name: Ramita Taengthai	Position: N/A	Phone: 0886334490	Email: ramita@enviresearch.co.th
Additional Remarks & Recommendations		Engineer Details		
		Date:	19-Jan-2022	
		Name:	Suwicha Choykamchu	
		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