

ภาคผนวกที่ 6
เอกสารสอบเทียบเครื่องมือ

ภาคผนวกที่ 6-1

เอกสารสอบเทียบคุณภาพอากาศในบรรยากาศ



RECALIBRATION DUE DATE: August 16, 2022

Certificate of Calibration

Calibration Certification Information			
Cal. Date: August 16, 2021	Rootsmeter S/N: 438320	Ta: 296 °K	
Operator: Jim Tisch		Pa: 750.8 mm Hg	
Calibration Model #: TE-5025A	Calibrator S/N: 710725		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.3820	3.2	2.00
2	3	4	1	0.9810	6.4	4.00
3	5	6	1	0.8740	8.0	5.00
4	7	8	1	0.8340	8.8	5.50
5	9	10	1	0.6910	12.7	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)
0.9904	0.7166	1.4104	0.9957	0.7205	0.8880
0.9861	1.0052	1.9946	0.9915	1.0107	1.2558
0.9840	1.1259	2.2300	0.9893	1.1320	1.4040
0.9829	1.1786	2.3389	0.9883	1.1850	1.4725
0.9778	1.4150	2.8208	0.9831	1.4227	1.7759
QSTD	m=	2.01649	QA	m=	1.26269
	b=	-0.03554		b=	-0.02237
	r=	0.99998		r=	0.99998

Calculations			
Vstd=	$\Delta Vol((Pa-\Delta P)/Pstd)(Tstd/Ta)$	Va=	$\Delta Vol((Pa-\Delta P)/Pa)$
Qstd=	$Vstd/\Delta Time$	Qa=	$Va/\Delta Time$
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

Tisch Environmental, Inc.
145 South Miami Avenue
Village of Cleves, OH 45002

www.tisch-env.com
TOLL FREE: (877)263-7610
FAX: (513)467-9009

Analyzer Performance Test

Calibrated Date: 13 July 2021

Instruments Information

Analyzer Type: SO2 Analyzer Model: 43C	Manufacturer Thermo Environmental S/N: 43C-65967-350
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Calibration System

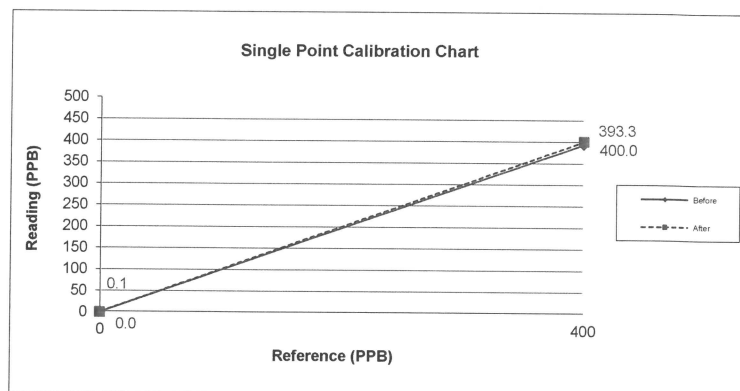
Calibrator Unit	Standard Gas
Dilutor Model Dasibi Model 5008 S/N: 705 ZERO AIR Generator API MODEL 701 S/N: 1924	NO Conc 55.47 PPM SO2 Conc 55.11 PPM CO Conc 4,535 PPM Cylinder number EB0129027 Expire Date: 29 Oct. 2027

Environment: Temperature 25.5 °C

Humidity: 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.1	0.1	400.0	393.3	-1.7
After	0.0	0.0	0.0	400.0	400.0	0.0



Analyzer Performance Test

Calibrated Date: 07 January 2022

Instruments Information

Analyzer Type: SO2 Analyzer Model: 43C	Manufacturer: Thermo Environmental S/N: 43C-0607415772
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Calibration System

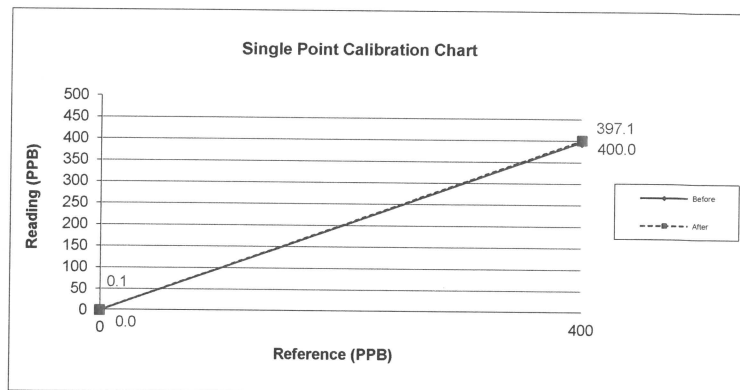
Calibrator Unit	Standard Gas
Dilutor Model Dasibi Model 5008 S/N: 705 ZERO AIR Generator API MODEL 701 S/N: 1924	NO Conc 55.47 PPM SO2 Conc 55.11 PPM CO Conc 4,535 PPM Cylinder number EB0129027 Expire Date: 29 Oct. 2027

Environment: Temperature 25.5 °C

Humidity: 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.1	0.1	400.0	397.1	-0.7
After	0.0	0.0	0.0	400.0	400.0	0.0



Analyzer Performance Test

Calibrated Date: 15 October 2021

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer Thermo Environmental S/N: 0528012676
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Calibration System

Calibrator Unit	Standard Gas
Dilutor Model Dasibi Model 5008 S/N: 705 ZERO AIR Generator API Model 701 S/N: 1924	NO Conc 55.47 PPM SO2 Conc 55.11 PPM CO Conc 4,535 PPM Cylinder number EB0129027 Expire Date: 29 Oct. 2027

Environment: Temperature 25.5 °C

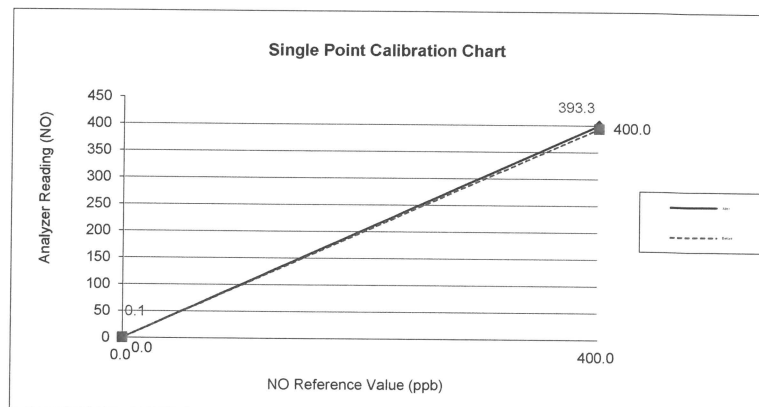
Humidity: 51 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.1	0.0	0.1	393.3	400.0	-1.7
NOx	0.1	0.0	0.1	397.7	400.0	-0.6

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.0	0.0	0.0	400.0	400.0	0.0
NOx	0.0	0.0	0.0	400.0	400.0	0.0



Analyzer Performance Test

Calibrated Date: 19 July 2021

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer Thermo Environmental S/N: 42C-65850-350
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Calibration System

Calibrator Unit	Standard Gas
Dilutor Model Dasibi Model 5008 S/N: 705 ZERO AIR Generator API Model 701 S/N: 1924	NO Conc 55.47 PPM SO2 Conc 55.11 PPM CO Conc 4.535 PPM Cylinder number EB0129027 Expire Date: 29 Oct. 2027

Environment: Temperature 25.5 °C

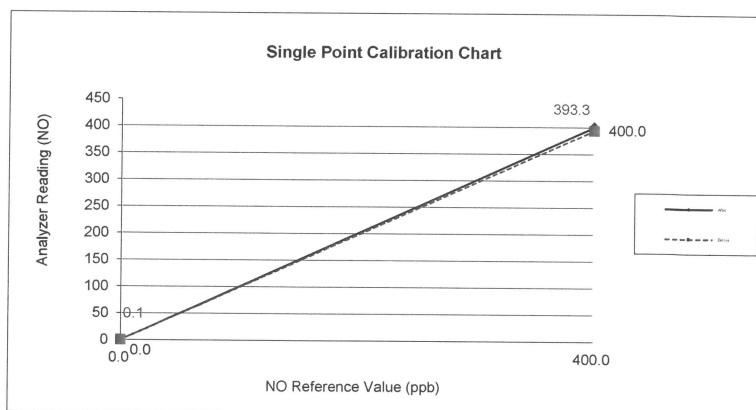
Humidity: 51 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.1	0.0	0.1	393.3	400.0	-1.7
NOx	0.1	0.0	0.1	396.6	400.0	-0.8

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.0	0.0	0.0	400.0	400.0	0.0
NOx	0.0	0.0	0.0	400.0	400.0	0.0



ภาคผนวกที่ 6-2
เอกสารสอบเทียบ
ปริมาณสารเจือปนในอากาศที่ระบายออกจากปล่อง

Certificate No. :E22-01001

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CERTIFICATE OF CALIBRATION

Customer : Pacific Laboratory Co., Ltd.

Address : 14/5358 Moo 14, Tambon Bang Bua Thong, Amphoe Bang Bua Thong,
Nonthaburi 11110

Description of Equipment : Console meter

Manufacturer : Apex Instrument

Model Number : XC-572-OV

Serial Number : 1306033

ID./Control No. : -

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

Cal. Date : 06/01/2022

Issue Date : 06/01/2022

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

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

Result of Calibration

This certificate may not be reproduced other than in full except with prior Written approval of the Technical Manager, Envi Equipment Service Company Limited.

These reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level



Calibrated by : _____

Approved by : _____

**METHOD 5 CONSOLE CALIBRATION
USING REFERENCE WET GAS METER W-NK-2.5-B-Z No.547425
5-POINT METRIC UNIT**

Meter Console Information	
Console Model Number	XC-572-OV
Console Serial Number	1306033
DGM Model Number	SK25EX
DGM Serial Number	00003603

Calibration Conditions			
Date	Time	06/01/2022	10:30 AM
Calibration Reference No.		E22-01001	
Barometric Pressure		761.24	mm Hg
Calibration Meter Gamma		0.999	

Factors/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
K ₁	0.386	
Console Leak Check		PASS

Calibration Data									
Run Time	Metering Console					Calibration Meter			
Elapsed	DGM Orifice DH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final
(Q)	(P _m)	(V _{mi})	(V _{mf})	(t _{mi})	(t _{mf})	(V _{wi})	(V _{wf})	(t _{wi})	(t _{wf})
min	mm H ₂ O	m ³	m ³	°C	°C	m ³	m ³	°C	°C
12.33	13.0	1336.648	1336.788	26	26	52.91720	53.05030	26	26
12.50	13.0	1336.788	1336.928	26	26	53.05030	53.18486	26	26
8.65	26.0	1336.935	1337.075	27	27	53.19182	53.32866	26	26
8.58	26.0	1337.075	1337.215	27	27	53.32866	53.46514	26	26
14.12	40.0	1337.224	1337.504	29	29	53.47394	53.74824	26	26
14.05	40.0	1337.504	1337.784	29	29	53.74824	54.02134	26	26
10.40	70.0	1337.791	1338.071	29	29	54.02794	54.30046	26	26
10.40	70.0	1338.071	1338.351	30	30	54.30046	54.57250	25	25
9.17	90.0	1338.358	1338.638	30	30	54.57908	54.85102	25	25
9.15	90.0	1338.638	1338.918	30	30	54.85102	55.12224	25	25



**METHOD 5 CONSOLE CALIBRATION
USING REFERENCE WET GAS METER W-NK-2.5-B-Z No.547425
5-POINT METRIC UNIT**

Calibration Data								
Results								
Standardized Data				Dry Gas Meter				
Dry Gas Meter		Calibration Meter		Calibration Factor		Flowrate	.0212 m ³ _{std} /min	Variation
				Value	Variation	Std & Corr		
(V _{m(std)})	(Q _{m(std)})	(V _{w(std)})	(Q _{w(std)})	(Y)	(ΔY)	(Q _{m(std)(corr)})	(ΔH _@)	(ΔH _@)
m ³	m ³ /min	m ³	m ³ /min			m ³ /min	mm H ₂ O	
0.138	0.011	0.130	0.011	0.948	-0.017	0.011	51.572	2.780
0.138	0.011	0.132	0.011	0.959	-0.006	0.011	51.770	2.978
0.138	0.016	0.134	0.016	0.974	0.009	0.016	48.063	-0.729
0.138	0.016	0.134	0.016	0.971	0.007	0.016	47.575	-1.217
0.276	0.020	0.269	0.019	0.975	0.010	0.019	49.145	0.353
0.276	0.020	0.268	0.019	0.971	0.006	0.019	49.111	0.318
0.277	0.027	0.267	0.026	0.966	0.001	0.026	47.564	-1.228
0.278	0.027	0.268	0.026	0.964	-0.001	0.026	47.572	-1.220
0.278	0.030	0.268	0.029	0.962	-0.003	0.029	47.735	-1.057
0.278	0.030	0.267	0.029	0.959	-0.006	0.029	47.815	-0.978
				0.965	Y Average		48.792	DH@ 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.

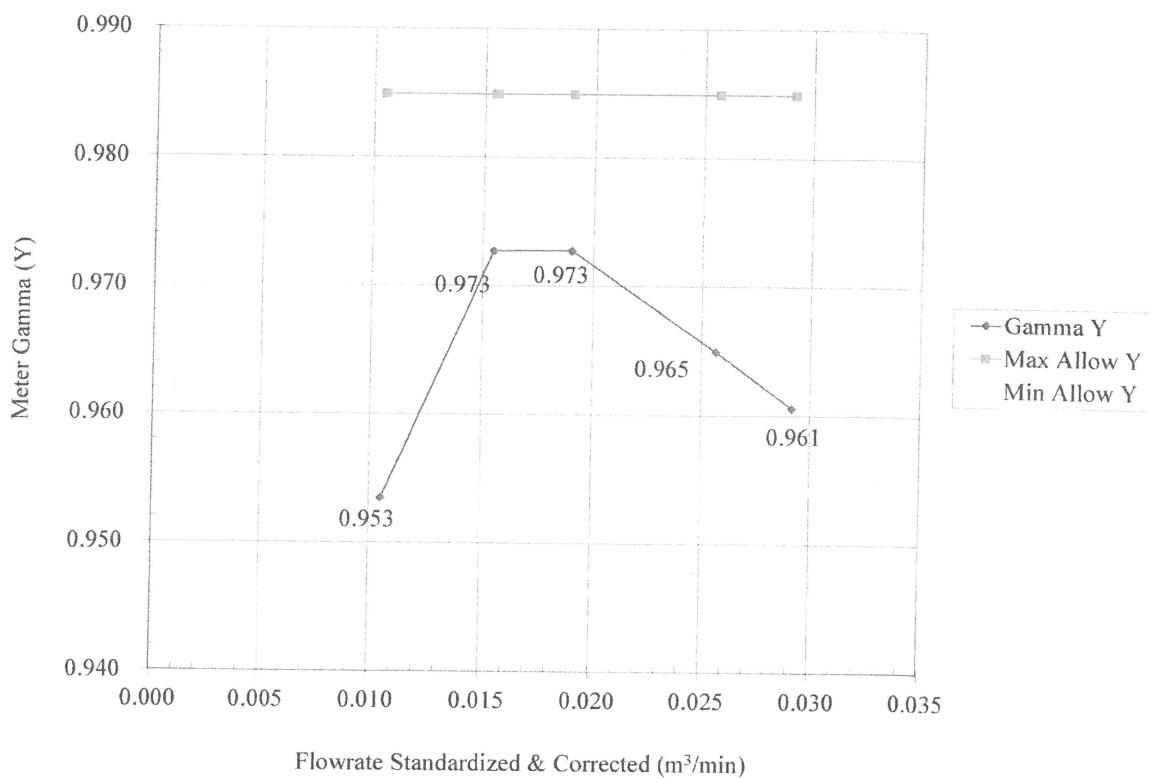
For ΔH_@, orifice pressure differential that equates to 0.75 cfm (0.0212 m³/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is ±0.2 inches (5.1mm) H₂O.



Calibration Date: 6-1-2022

Calibration Reference No: E22-01001

Meter Gamma vs Flowrate



Console Serial: 1306033

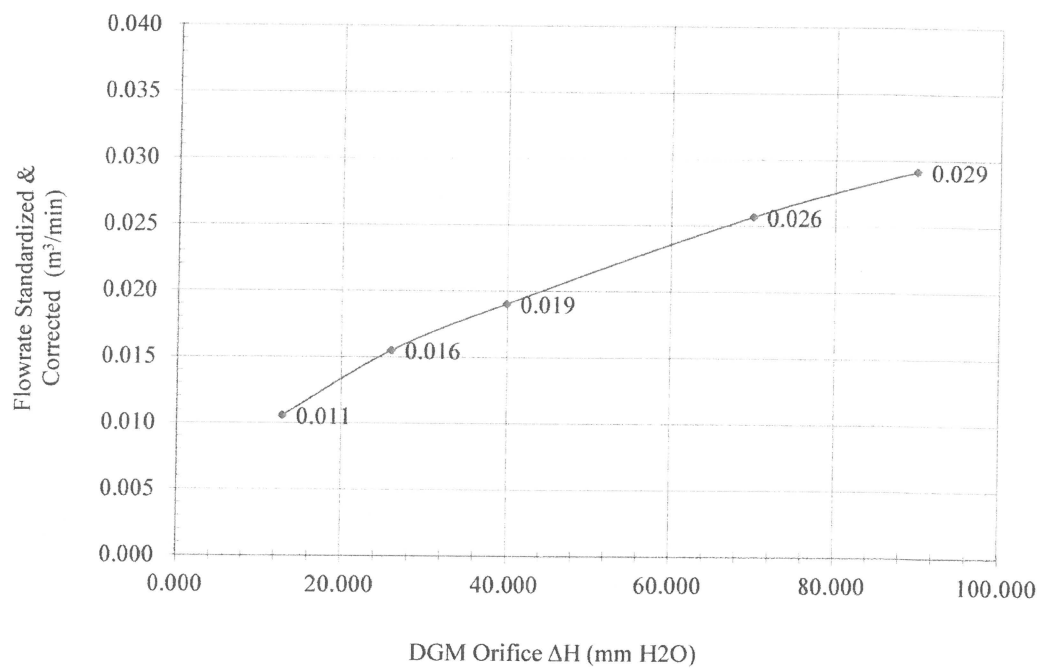
Console Model: XC-572-OV



Calibration Date: 6-1-2022

Calibration Reference No: E22-01001

Meter Pressure vs Flowrate



Console Serial: 1306033

Console Model: XC-572-OV



THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information	
Console Model Number	XC-572-OV
Console Serial Number	1306033
DGM Model Number	SK25EX
DGM Serial Number	00003603
Meter Box Model Number	JENCO 765 KF
Meter Box Serial Number	JC 13335

Calibration Conditions			
Date	Time	06/01/2022	01:00 PM
Calibration Reference No.	E22-01001		
Reference Thermometer	DIGICON		
Serial Number	183169105		

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	-16.0	26.0	39.0	95.0	151.0	262.0	373.0	484.0	595.0	818.0	1040.0
Aux	-16.0	26.0	39.0	95.0	151.0						
Probe	-	-	-	-	-						
Filter	-16.0	26.0	39.0	95.0	151.0						
Oven	-	-	-	-	-						
Exit	N/D	N/D	N/D								

Tolerance Range

Stack ± 1.50% Absolute
 Probe ± 3.0 °C
 Filter ± 3.0 °C

Meter ± 3.0 °C
 Exit ± 2.0 °C



Envi Equipment Service Co., Ltd.

110/254 Moo 3, Tambon Bang Rak Phatthana, Amphur Bang Bua Thong, Nonthaburi 11110

Tel. 098 362 9152, 089 478 7885

E-mail: sales@envi-ees.com

Certificate No. :E22-01002

Page :1 of 2

CERTIFICATE OF CALIBRATION

Customer : Pacific Laboratory Co., Ltd.

Address : 14/5358 Moo 14, Tambon Bang Bua Thong, Amphoe Bang Bua Thong, Nonthaburi 11110

Description of Equipment : Nozzle

Manufacturer : Apex Instrument

Model Number : NS SET

Serial Number : -

ID./Control No. : -

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

Cal. Date : 05/01/2022

Issue Date : 05/01/2022

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

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

Result of Calibration

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These reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level

Calibrated by : Mr. Sanya Sangnil

Approved by : (Mr. Mana Fuekhud)
Technical Manger



CALIBRATION RESULTS

Sampling System Equipment Information

Nozzle Model : NS SET
Nozzle Number : -
Nozzle Type : Stainless Steel

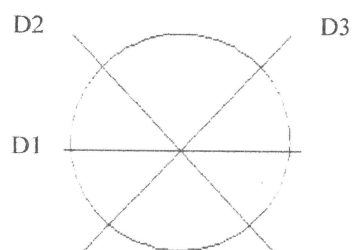
Calibration Condition

Date : 5 January 2022
Barometric Pressure : 758.99 mm Hg
Calibration Device : Vernier, 0-150 mm
Method Reference : US. EPA Method

Nozzle ID	Nozzle Diameter				Different	(D1 + D2 + D3) / 3
Size		D1	D2	D3	ΔD	Davg
	mm	mm	mm	mm	mm	mm
NS-5	3.97	3.78	3.88	3.85	0.051	3.837
NS-7	5.56	5.35	5.34	5.34	0.006	5.343
NS-9	7.14	6.88	6.81	6.86	0.036	6.850
NS-11	8.73	8.44	8.45	8.45	0.006	8.447
NS-13	10.32	10.18	10.18	10.17	0.006	10.177
NS-15	11.91	11.64	11.64	11.64	0.000	11.640
NS-17	13.49	13.30	13.30	13.30	0.000	13.300

Remark:

D1, D2, D3 = There difference nozzle diameters, mm; diameter must be within 0.025 mm
 ΔD = Maximum difference between any two diameters, must be ≤ 0.100 mm
 Davg = $(D1 + D2 + D3) / 3$



Envi Equipment Service Co., Ltd.

110/254 Moo 3, Tambon Bang Rak Phatthana, Amphur Bang Bua Thong, Nonthaburi 11110

Tel. 098 362 9152, 089 478 7885

E-mail: sales@envi-ees.com

Certificate No. :E22-01003

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CERTIFICATE OF CALIBRATION

Customer : Pacific Laboratory Co., Ltd.
Address : 14/5358 Moo 14, Tambon Bang Bua Thong, Amphoe Bang Bua Thong,
Nonthaburi 11110
Description of Equipment : Standard Probe Method 5
Manufacturer : Apex Instrument
Model Number : PS-4HV
Serial Number : -
ID./Control No. : -
Environment Conditions : Temperature (25 ± 2) °C
: Humidity (50 ± 15) % RH
Cal. Date : 05/01/2022
Issue Date : 05/01/2022

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

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

Result of Calibration

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Calibrated by : _____

Approved by : _____

CALIBRATION RESULTS

S-Type Geometric Pitot Tube Calibration

Sampling System Equipment Information

Probe Model : PS-4HV
 Probe Number : -
 Pitot Number : -
 Pitot Tube Type : S-type

Calibration Condition

Date : 5 January 2022
 Barometric Pressure : 758.99 mm Hg
 Digital Caliper : CD-6" ASX
 Serial number : A18008059

Pitot tube/Probe: # PS-4HV			
Parameter	Value	Allowable Range	Check
Assembly level?	Yes	Yes	Pass
Ports Damage?	No	No	Pass
$\alpha 1$	0	$-10^\circ < \alpha 1 < +10^\circ$	Pass
$\alpha 2$	1	$-10^\circ < \alpha 2 < +10^\circ$	Pass
$\beta 1$	0	$-5^\circ < \beta 1 < +5^\circ$	Pass
$\beta 2$	0	$-5^\circ < \beta 2 < +5^\circ$	Pass
y	0	N/A	-
θ	0	N/A	-
Dt	0.375	.188 " to .375 "	Pass
A	0.904	$2.1Dt \leq A \leq 3Dt$	Pass
A/2Dt	1.205	$1.05 \leq P_A/D_t \leq 1.5$	Pass
$Z = A \tan y$	0.045	$Z \leq .125"$	Pass
$W = A \tan \theta$	0.018	$W \leq .031"$	Pass

Remark:

I certified that probe model: **PS-4HV** meets or exceeds all specifications, criteria and/or applicable design and is hereby assigned a pitot tube certification factor of **0.84**. See 40 CFR Pt. 60, App. A, EPA Method 2.



THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information	
Probe Model Number	PS-4HV
Probe Serial Number	-
Meter Box Model Number	JENCO 765 KF
Meter Box Serial Number	JC 13335

Calibration Conditions			
Date	Time	05/01/2022	04:00 PM
Calibration Reference No.		E22-01003	
Reference Thermometer		DIGICON	
Serial Number		183169105	

Thermocouple of Standard Probe method 5 = length 4 foot			
Set Point	Reference Thermocouple	Probe Thermocouple	Difference
100	100.0	98.0	0.54
250	250.0	247.0	0.57
300	300.0	298.0	0.35
350	350.0	349.0	0.16





TEST REPORT FOR FLUE GAS ANALYZER

Customer Name PACIFIC LABORATORY CO.,LTD.

Brand TESTO
Model Testo 310
Serial No. 42828350
Tested on 26-Oct-21
LCD Display PASS
Lamp LEDS PASS
Overall Result PASS

Standard gas Mixed : Cylinder No.EB0126329 Expried Date Dec 19, 2022

Calibration Results

Gas Applied	Range	Reading	Calibrated To	Result
Zero Air	% O2	21	21	PASS
Zero Air	PPM CO	0	0	PASS

Gas Applied	Range	Reading	Calibrated To	Result
18% Vol Oxygen	% O2	18.4	18.0	PASS
101 PPM CO	PPM CO	99	101	PASS

Cc



www.esithailand.com / E-mail : into@esithailand.com



บริษัท เอสไอโซลูชั่นส์ อินเตอร์เนชั่นแนล จำกัด
Environmental Solution Integrator Co., Ltd.



Certificate of Calibration

Equipment:	SPECTROPHOTOMETER	Certificate No.:	C06210315
Model:	DR3900	Issued Date:	13 July 2021
Serial No. (or ID.):	2076219	Job No.:	KSPR2109642
Manufacturer:	HACH	Page:	1 of 2
Condition:	New		

Customer: PACIFIC LABORATORY CO.,LTD.
14/5358 Moo 14 Tambol Bang Bua Thong,
Amphoe Bang Bua Thong, Nonthaburi 11110

Environment Condition:

Temperature	23	°C	±	2	°C
Humidity	50	%RH	±	15	%RH

Calibration Place: Environment Laboratory, SPC RT Co., Ltd.
1194 Soi Wachirathamsathit 57, Sukhumvit 101/1 Rd.,
Bangchak, Prakhonong, Bangkok 10260 Thailand

Calibration By: Mr. Atachai Ngamchanat

Calibration Date: 13 July 2021

The Method used: In house method, SPCC-WI-24, base on ASTM E 275-08 and ASTM E 387-04

Traceability: This certificate is traceable to the CRM maintained by National Institute of Standards and Technology (NIST) through Starna Scientific Limited.

The standard for Wavelength Certificate No. 87146 and 87152

The standard for Photometric Certificate No. 87220

Person in Charge

Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor ($k=2$) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).

These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of SPC RT Co., Ltd.

Calibration Results:

Without Adjustment

Wavelength Accuracy (nm), The spectral bandwidth of Std at 5 nm and UUC at 5 nm

Standard Wavelength	Unit Under Calibration	Correction	Uncertainty
418.40	418	0.40	0.59
537.00	536	1.00	0.59
638.00	637	1.00	0.59
747.61	747	0.61	0.59
807.04	807	0.04	0.59

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
420 nm	0.0000	0.000	0.0000	0.0045
	0.5890	0.587	0.0020	0.0045
	0.7616	0.759	0.0026	0.0045
	1.0263	1.026	0.0003	0.0045
440 nm	0.0000	0.000	0.0000	0.0045
	0.5787	0.576	0.0027	0.0045
	0.7442	0.741	0.0032	0.0045
	1.0039	1.003	0.0009	0.0045
465 nm	0.0000	0.000	0.0000	0.0045
	0.5292	0.529	0.0002	0.0045
	0.6865	0.686	0.0005	0.0045
	0.9534	0.956	-0.0026	0.0045
546.1 nm	0.0000	0.000	0.0000	0.0045
	0.5468	0.546	0.0008	0.0045
	0.6957	0.694	0.0017	0.0045
	0.9991	1.000	-0.0009	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.5851	0.587	-0.0019	0.0045
	0.7238	0.721	0.0028	0.0045
	1.0957	1.093	0.0027	0.0045
635 nm	0.0000	0.000	0.0000	0.0045
	0.5692	0.567	0.0022	0.0045
	0.6914	0.689	0.0024	0.0045
	1.0881	1.087	0.0011	0.0045

ภาคผนวกที่ 6-3
เอกสารสอบเทียบปริมาณความเข้มข้นละอองและสารเคมี
ในบรรยากาศการทำงาน

Personal Pump Calibration Report

Calibrate No. : CP176/2565

Calibrate Date : May 5, 2022

Equipment Type : Personal Pump
Calibration Type : DRYCAL DC-LITE FLOWMETER
Volume for Calibration : 0.5, 2.0 l/min
Environment Conditions : 29.0 Deg C.
Environment Pressure : 758.0 mmHg.
Customer Name : บริษัท อลูมิเนียม ฉี้อ จิ้น ฮั่ว จำกัด

Item	Personal Pump Serial Number	Flow Rate	First Time	Second Time	Third Time	Forth Time	Average	Uncertainty
1.	S/N 20200804140	0.5 l/min	0.5035	0.5036	0.5033	0.5037	0.5035	± 0.0002
2.	S/N 20200804100	2.0 l/min	2.049	2.052	2.048	2.051	2.050	± 0.0018
3.	S/N 20200804098	2.0 l/min	2.016	2.019	2.017	2.020	2.018	± 0.0018

BORATOR

Calibration By



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Mechanical Engineering Standards Laboratory Soi 1, Bangpoo Industrial Estate, Muang, Samutprakan 10280, Thailand.

Request No.23-65/0151

MTC.No.23-65/0151

Number of page(s) 2

CALIBRATION CERTIFICATE

Nomenclature : DRYCAL DC-LITE FLOWMETER

Manufacturer : BIOS International Corporation, USA.

Serial No.: 104699

Model : DCL-M, Rev 1.09

Scale range : 100 ml/min to 7 l/min

Subdivision : (0.0001, 0.001) l/min

Submitted by : PACIFIC LABORATORY CO.,LTD.

14/5358 Moo14, T.Bang Bua Thong, A.Bang Bua Thong,
Nonthaburi 11110, Thailand.

Received date : 20 December 2021 **Condition of measured item :** Normal

Calibration date : 5 January 2022

Standard :

Standard	Certificate No.	Date due	Traceability
RTD Thermometer	PSL-T 336/63	6-Apr-22	TISTR
Molbox/PressureTransducer/UpStream	MP-0013-21	25-Jan-23	NIMT
Primary Flow Calibrator S/N 117982	MW-0011-21	8-Apr-23	NIMT
Primary Flow Calibrator S/N 119521	MW-0012-21	31-Mar-23	NIMT

Calibrated by : .

Director
TISTR

Mechanical Engineering Standards Laboratory

Ref. 2013264122005240001

Issued Date 5 January 2022

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FM.BL.MTC.002 Rev.4

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9000
Fax. (66) 0 2577 9009
E-mail : rumpai@tistr.or.th Website:www.tistr.or.th

Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,
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)

Mechanical Engineering Standards Laboratory Soi 1, Bangpoo Industrial Estate, Muang, Samutprakan 10280, Thailand.

Request No.23-65/0151

2/2

MTC.No.23-65/0151

Calibration point : (0.05, 0.1, 0.2, 1.0, 2.0, 3.0) l/min

Ambient condition : Temperature (23 ± 3) °C , Relative humidity (55 ± 15) %

Atmospheric pressure (1010 ± 13) hPa

Calibration method : The flowmeter (UUC) was calibrated by comparison method with standard flowmeter according to CP-370.01.

The reported value is the value that converted to value at reference condition within pressure and temperature of the actual gas entering the UUC

Measurement data :

UUC Value (l/min)	Standard Value (l/min)	Temperature (°C)	Pressure (hPa)	Deviation (%)	Uncertainty (%)
0.0538	0.052932	22.341	1009.53	+1.64	1.04
0.1035	0.10226	22.760	1013.89	+1.24	0.99
0.2021	0.20002	22.560	1013.78	+1.06	0.98
1.022	1.0146	22.289	1013.97	+0.72	0.85
2.007	1.9940	22.340	1014.53	+0.65	0.85
3.009	2.9912	22.438	1015.13	+0.58	0.85

The reported expanded uncertainties are based on standard uncertainties multiplied by a coverage factor $k=2$, which provides a level of confidence of approximately 95%.

The end of calibration certificate.

78.

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FM.BL.MTC.002 Rev.4

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand

Tel. (66) 0 2577 9000

Fax. (66) 0 2577 9009

E-mail : rumpai@tistr.or.th Website:www.tistr.or.th

Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,
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



CERTIFICATE No : 21M7483
REFERENCE No : 62011-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE
MANUFACTURER : METTLER TOLEDO
MODEL : DRAGON 204
SERIAL No : 1200500387
ID No : LAB-BL-002
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : PACIFIC LABORATORY CO., LTD.
14/5358 MOO. 14 TAMBOL BANGBUA THONG
AMPHOE BANG NUA THONG, NONTHABURI
11110

CALIBRATED BY : ATSAWIN Y.

CALIBRATION DATE : 06-Aug-21

APPROVED BY : _____

ISSUED DATE : 07-Aug-21

RECEIVED DATE : 06-Aug-21



CERTIFICATE No : 21M7483

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE MODEL : DRAGON 204
MANUFACTURER : METTLER TOLEDO S/N : 1200500387
ID No : LAB-BL-002 RECEIVED DATE : 06-Aug-21
AIR PRESSURE : 1009mbar \pm 1mbar CALIBRATION DATE : 06-Aug-21
AMBIENT TEMPERATURE : 24°C \pm 1°C RELATIVE HUMIDITY : 49 %RH \pm 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS ADJUSTED USING WEIGHT OF QUALITY CALIBRATION TO ADJUST. THE BALANCE HAS NO ZERO TRACKING FUNCTION. REPEATABILITY WAS MEASURED BY USING 10 REPEATED MEASUREMENTS. LINEARITY WAS MEASURED COVERING 10 POINTS, EVENLY SPREAD OVER THE RANGE. THE INSTRUMENT WAS SET ZERO BEFORE PERFORMING THE LINEARITY TEST. OFF-CENTER LOADING WAS MEASURED BY USING STANDARD WEIGHTS PLACED ON THE PAN AND MOVED TO VARIOUS POSITIONS ON THE PAN.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) STANDARD WEIGHT SET	E2	QK-I-151	C02210415	09-Feb-23

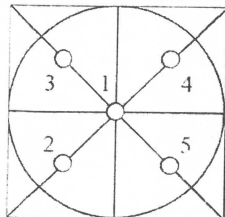
3. THIS RESULT WAS FOUND ACCURATE AS SHOWN ON DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH CENTRAL BUREAU OF WEIGHTS&MEASURES

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL
2. TARE FUNCTION : NORMAL
3. REPEATABILITY OF READING AT 200 g WAS 0.000042 g
4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (\pm g)
0.000	0.0000	0.0000	0.000073
0.001	0.0010	0.0000	0.000073
0.010	0.0100	0.0000	0.000074
0.050	0.0500	0.0000	0.000075
0.100	0.1000	0.0000	0.000074
1.000	1.0000	0.0000	0.000075
2.000	2.0000	0.0000	0.000075
5.000	5.0000	0.0000	0.000077
20.000	20.0000	0.0000	0.000085
50.000	50.0000	0.0000	0.00013
100.000	100.0001	-0.0001	0.00019
150.000	150.0001	-0.0001	0.00026
200.000	200.0000	0.0000	0.00032

5. OFF CENTER LOADING ERROR



POINT	READING (g)
1	100.0000
2	99.9999
3	100.0001
4	99.9999
5	100.0000
OFF-CENTER LOADING	0.0001

NOTE: THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA
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

ใบรับรองการสอบเทียบ “เครื่อง Ion chromatography”

(Calibration Certificate of Ion chromatography)



ห้องปฏิบัติการวิเคราะห์เอกชน
เลขทะเบียน ว-244



Certificate of Calibration

Aquion: Anion (ID#822)

This certificate is to verify that instrument below are calibrated

by Archemica Lab Co., Ltd.

Aquion S/N: 180344663

For

Emex Association Co., Ltd.



ห้องปฏิบัติการวิเคราะห์เอกชน
เลขทะเบียน ว-244

Operator Signature: __

Date: January 10, 2022

(Mr.Thitipong Piromkripuk)

Applications Chemist



Checklist ICS Preventive Maintenance

Dionex Ion Chromatography
Preventive Maintenance Report

Customer Organization	Name/ Department
Emex Association Co.,Ltd.	K.Kamchana
Engineer	Date
Thitipong Piromkripuk	10-Jan-2022

Instrument Detail

Instrument Model	Application
Aquion (ID#822, 1st Contract)	Anion
Instrument components	Serial Number
Aquion	180344663

Consumable Detail

Columns	Guard Columns	Suppressors	Concentrators	Etc.
AS22 (4mm)	AG22 (4mm)	AERS 500 (4mm)	-	-

Remark: -



Perform By
Archemica Lab Co.,Ltd



ห้องปฏิบัติการวิเคราะห์เอกชน
เลขทะเบียน ว-244

ThermoFisher
SCIENTIFIC
Chromeleon Operational Qualification

General Information

Computer Name Version Number:
Instrument Controller: DESKTOP-D97O01E 7.2.7 Build 10369 (290782)
Client: DESKTOP-D97O01E 7.2.7.10369
Operator: Thitipong Piromkripuk

Overall Test Result: **Passed**

Comparison Format:

All Parameters:	Significant Digits:	10
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ห้องปฏิบัติการวิเคราะห์เอกชน
เลขทะเบียน ว-244

ภาคผนวกที่ 6-4
เอกสารสอบเทียบระดับความดังเสียง
(Sound Level Meter)

Certificate No.: CP20220120EA

Operation No.: CP2022030033

Certificate of Calibration

Equipment: Sound Calibrator

Manufacturer: TENMARS

Model/Type: TM-100

Serial No.: 190301469

ID No.: -

Customer: Pacific Laboratory Co., Ltd.

Address:

Received Date: 28 March 2022

Calibrated Date: 31 March 2022

Issued Date: 1 April 2022

Calibrated by: Ms. Juntaporn Kunhakom

Approved by: _

This report was prepared electronically using applicable electronic signature. Printing or copy of file are considered as a copy of the document.

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor (k) providing a level of confidence of approximately 95%. This certificate may not be reproduced other than in full except with the prior written approval of the Electrical and Electronics Institute, Foundation for Industrial Development.

Certificate No.: CP20220120EA

Calibration Report

Equipment: Sound Calibrator
Manufacturer: TENMARS
Model/Type: TM-100
Serial No.: 190301469
ID No.: -
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa

Method of Calibration :-

IEC 60942:2017

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2661000	AA-1010-21	13 June 2022
2) Waveform Generator	33511B	MY52302264	0144RF21	17 June 2022
3) Audio Analyzing DMM	2015-P	000136E	E1U214805	16 November 2022
4) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P210047 0255TE21	16 June 2022 7 July 2022

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

3. This certification is traceable to the international system of unit maintained at :-

Reference standards instrument for Acoustic function

- National Institute of Metrology (Thailand)

Reference standards instrument for Electrical function

- Electrical and Electronics Institute; ONSC Accredited Calibration No.0119

Result of Calibration:-

1. Function : Sound pressure level

Normal Frequency (Hz)	Specified Sound Pressure level (dB)	Measured value (dB)	Deviated value ^[1] (dB)	Acceptance limit ^[3] (dB)
1000	94	93.99	-0.01	±0.40
1000	114	114.10	0.10	±0.40

2. Function : Frequency

Normal Sound Pressure level (dB)	Specified Frequency (Hz)	Measured value (Hz)	Deviated value ^[2] (%)	Acceptance limit ^[3] (%)
94	1000	970.2	-3.0	±1.7
114	1000	965.8	-3.4	±1.7

Certificate No.: CP20220120EA

Calibration Report

3. Function : Total distortion + noise

Norminal Sound Pressure level (dB)	Norminal Frequency (Hz)	Measured value ^[4] (%)	Acceptance limit ^[5] (%)
94	1000	2.8	3.0
114	1000	2.0	3.0

Uncertainty of measurement

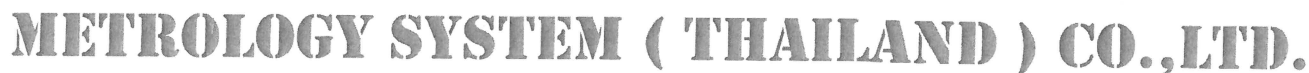
Function	Uncertainty	Maximum-permitted uncertainty of measurement
Sound pressure level	0.10 dB	0.35 dB
Frequency	0.10 %	0.20 %
Total distortion + noise	0.40 %	1.00 %

- Note:
- [1] The deviated value is the absolute value of the difference between the measured value and the corresponding specified sound pressure level.
 - [2] The deviated value is the absolute value of the difference in percent between the measured value and the corresponding specified frequency.
 - [3] The acceptance limit is for the deviated value.
 - [4] The measured value is the total distortion + noise, measured over the frequency range from 20 Hz to 20 kHz.
 - [5] The acceptance limit is for the Measured value.

Remarks: 1. Acceptance limit was IEC 60942:2017 Class 2.
2. The coverage factor $k = 2.00$

- - End of Report - -

ภาคผนวกที่ 6-5
เอกสารสอบเทียบสภาพความร้อน (Heat Stress)



Certificate of Calibration

Certificate Number : SPR22030094-2

Page : 1 of 3

Customer : Pacific Laboratory Co.,Ltd.

14/5358 Moo 14 Tambol Bang Bua Thong, Amphoe Bang Bua Thong,
Nonthaburi 11110

Equipment Name : Area Heat Stress Monitor

Manufacturer : Quest Technologies

Model : QUESTemp 34

Serial Number : TED060012

ID. Number : N/A

Environmental Conditions

Ambient Temperature : 23 °C ± 2 °C Received Date : 07 Mar 2022

Relative Humidity : 50 % \pm 15 % Calibration Date : 08 Mar 2022

Location of Calibration : In-Lab Recommend Due Date : 08 Mar 2023

Calibration Procedure : SP-CPT-04-13 Date of Issue : 09 Mar 2022

Method of Calibration

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

All calibrations are performed within manufacture's specifications. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Navaporn Uengseng

Approved by :

Calibration Officer

Authorized Signatory



Calibration Report

Certificate Number : SPR22030094-2

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Humidity Chamber	TH-80S	N/A	SPR22010401-8	05 Mar 2023
THERMO-HYGROMETER	5020A	A47046	QR22-0191	02 Feb 2023

Traceability

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

SP Metrology - SP Metrology system (Thailand) Co.Ltd.

Quality Reborn Co., Ltd



Result of Calibration

Certificate No. : SPR22030094-2

Page : 3 of 3

Temperature Accuracy in the Measurement. (WET)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.011	30.1	0.089	0.50
32.0	32.014	32.2	0.186	0.50
34.0	34.012	34.0	-0.012	0.50

Temperature Accuracy in the Measurement. (DRY)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.011	30.1	0.089	0.50
32.0	32.014	32.2	0.186	0.50
34.0	34.012	33.9	-0.112	0.50

Temperature Accuracy in the Measurement. (GLOBE)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.011	30.1	0.089	0.50
32.0	32.014	32.2	0.186	0.50
34.0	34.012	33.9	-0.112	0.50

Note:

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

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2$, providing a level of confidence approximately 95%.

- End of Certificate -



Certificate of Calibration

Certificate Number : SPR22010143-2

Page : 1 of 3

Customer : Pacific Laboratory Co.,Ltd.

14/5358 Moo 14 Tambol Bang Bua Thong, Amphoe Bang Bua Thong,
Nonthaburi 11110

Equipment Name : Area Heat Stress Monitors

Manufacturer : Quest Technologies

Model : QUESTemp 36

Serial Number : TKJ090016

ID. Number : N/A

Environmental Conditions

Ambient Temperature : $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$

Received Date : 12 Jan 2022

Relative Humidity : $50\% \pm 15\%$

Calibration Date : 16 Jan 2022

Location of Calibration : In-Lab

Recommend Due Date : 16 Jan 2023

Calibration Procedure : SP-CPT-04-13

Date of Issue : 17 Jan 2022

Method of Calibration

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

All calibrations are performed within manufacture's specifications. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr. Prayoon Topart

Approved by :

Calibration Officer



Calibration Report

Certificate Number : SPR22010143-2

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Humidity Chamber	TH-80S	N/A	SPR21020224-9	04 Mar 2022
THERMO-HYGROMETER	5020A	A47046	PSL-H 302/63	30 Sep 2022

Traceability

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

SP Metrology - SP Metrology system (Thailand) Co.Ltd.

TISTR - Thailand Institute of Scientific and Technological Research



Result of Calibration

Certificate No. : SPR22010143-2

Page : 3 of 3

Temperature Accuracy in the Measurement. (WET)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.014	30.0	-0.014	0.50
32.0	32.016	32.0	-0.016	0.50
34.0	34.011	34.0	-0.011	0.50

Temperature Accuracy in the Measurement. (DRY)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.014	30.1	0.086	0.50
32.0	32.016	32.1	0.084	0.50
34.0	34.011	34.1	0.089	0.50

Temperature Accuracy in the Measurement. (GLOBE)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.014	30.1	0.086	0.50
32.0	32.016	32.1	0.084	0.50
34.0	34.011	34.1	0.089	0.50

Note:

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

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2$, providing a level of confidence approximately 95%.

- End of Certificate -

ภาคผนวกที่ 6-6
เอกสารสอบเทียบคุณภาพน้ำทิ้ง

CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech_cal@yahoo.com, calibratech_cal@hotmail.com



NSC-TISI-TIS 1/024
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-400590-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd
14/5358 Moo 14, T. Bang Bua Thong, A. Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : Digital Thermometer with Thermistor probe
Temperature Indicator

Manufacturer : Eutech Model : pH 700
Range : N/A °C Resolution : 0.1 °C
Serial No. : 2841305 ID No. : LAB-PH-002

Thermistor probe
Model : N/A Sheath Material : Stainless
Diameter : 3 mm. Length : 115 mm.
Serial No. : PHSTEMB01P 049 ID No. : LAB-PH-002

Environment : On site calibration was carried out at the Laboratory, Pacific Laboratory Co., Ltd

Ambient Temperature : (23.5 to 24.0) °C
Relative Humidity : (50 to 55) %
Line Voltage : (220.0 to 222.0) VAC

Date of Received : 26 November 2021

Date of Calibration : 26 November 2021

Date of Issue : 27 November 2021

Calibrated by : Bunjerd Masri

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

The temperature scale used was based on ITS-90

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

1. Platinum Resistance Thermometer (PRT)

ID No.	Cert. No.	Due Date	Traceability
400002	TT-0050-20	18 Jun 2022	National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No.	Cert. No.	Due Date	Traceability
400033	20E612	17 Feb 2022	National Institute of Metrology Thailand (NIMT)

Approved b

The Uncertainties are for a confidence probability of approximately 95%

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CAL-F0031-03



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

Certificate of Calibration

Certificate No. : 64-400590-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
115	25.003	24.9	0.1	0.19

Remark

UUC : Unit Under Calibration

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

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



CAL

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NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-420130-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

14/5358 Moo 14, T.Bang Bua Thong, A.Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : pH Meter with electrode

pH meter

Manufacturer : Eutech

Model : pH 700

Range : N/A pH

Resolution : 0.01 pH

Serial No. : 2841305

ID No. : LAB-PH-002

Electrode

Model : N/A

Serial No. : 2925294

Environment :

On site calibration was carried out at the Laboratory, Pacific Laboratory Co., Ltd.

Ambient Temperature : (23.4 to 23.8)°C

Relative Humidity : (52 to 55) %

Date of Received : 26 November 2021

Date of Calibration : 26 November 2021

Date of Issue : 26 November 2021

Calibrated by : Bunjerd Masri

Calibration Method : In-house method CAL-M4201 direct measurement by using standard voltage calibrator and using certified reference material (CRM)

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

1. Multiproduct Calibrator

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
400005	SG-E-00473/64	27 Aug 2023	National Institute of Metrology Thailand (NIMT)

2. Standard Buffer Solution

<u>pH</u>	<u>Cert. No.</u>	<u>Lot No.</u>	<u>Exp. Date</u>	<u>Traceability</u>
4.004	61218215	769926	15 May 2022	CPA chem
6.985	61223875	769927	15 May 2022	CPA chem
9.963	61208865	769928	15 May 2022	CPA chem

Approved by : _____

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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CAL

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7/106-7 Moo 2, Sukhaphrachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

Certificate of Calibration

Certificate No. : 64-420130-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

Adjustment Curve at nominal pH	Applied Voltage (mV)	Nominal Value (pH)	UUC Reading		Correction (mV)	Uncertainty (± mV)
			(pH)	(mV)		
4, 7, 10	177.4800	4	4.00	177.5	0.0	0.12
	0.0000	7	7.00	0.0	0.0	0.086
	-177.4800	10	10.00	-177.5	0.0	0.12

Function : pH meter with electrode

Performing a three - buffer standard curve using buffer nominal pH (4,7,10)

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (± pH)
4, 7, 10	4.004	4.00	0.00	0.011
	6.985	7.00	-0.01	0.020
	9.963	10.00	-0.04	0.053

Remark

UUC : Unit Under Calibration

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

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

- 0() 0 -





CERTIFICATE No : 21M7483
REFERENCE No : 62011-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE
MANUFACTURER : METTLER TOLEDO
MODEL : DRAGON 204
SERIAL No : 1200500387
ID No : LAB-BL-002
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : PACIFIC LABORATORY CO., LTD.
14/5358 MOO. 14 TAMBOL BANGBUA THONG
AMPHOE BANG NUA THONG, NONTHABURI
11110

CALIBRATED BY : ATSAWIN Y.

CALIBRATION DATE : 06-Aug-21

APPROVED BY : _____

ISSUED DATE : 07-Aug-21

RECEIVED DATE : 06-Aug-21



QUALITY CALIBRATION CO.,LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkae, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

www.qcalibration.com

CERTIFICATE No : 21M7483

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE MODEL : DRAGON 204
MANUFACTURER : METTLER TOLEDO S/N : 1200500387
ID No : LAB-BL-002 RECEIVED DATE : 06-Aug-21
AIR PRESSURE : 1009mbar \pm 1mbar CALIBRATION DATE : 06-Aug-21
AMBIENT TEMPERATURE : 24° C \pm 1° C RELATIVE HUMIDITY : 49 %RH \pm 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS ADJUSTED USING WEIGHT OF QUALITY CALIBRATION TO ADJUST. THE BALANCE HAS NO ZERO TRACKING FUNCTION. REPEATABILITY WAS MEASURED BY USING 10 REPEATED MEASUREMENTS. LINEARITY WAS MEASURED COVERING 10 POINTS, EVENLY SPREAD OVER THE RANGE. THE INSTRUMENT WAS SET ZERO BEFORE PERFORMING THE LINEARITY TEST. OFF-CENTER LOADING WAS MEASURED BY USING STANDARD WEIGHTS PLACED ON THE PAN AND MOVED TO VARIOUS POSITIONS ON THE PAN.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) STANDARD WEIGHT SET	E2	QK-I-151	C02210415	09-Feb-23

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) THROUGH CENTRAL BUREAU OF WEIGHTS&MEASURES

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL

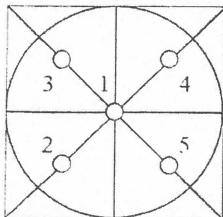
2. TARE FUNCTION : NORMAL

3. REPEATABILITY OF READING AT 200 g WAS 0.000042 g

4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (\pm g)
0.000	0.0000	0.0000	0.000073
0.001	0.0010	0.0000	0.000073
0.010	0.0100	0.0000	0.000074
0.050	0.0500	0.0000	0.000075
0.100	0.1000	0.0000	0.000074
1.000	1.0000	0.0000	0.000075
2.000	2.0000	0.0000	0.000075
5.000	5.0000	0.0000	0.000077
20.000	20.0000	0.0000	0.000085
50.000	50.0000	0.0000	0.00013
100.000	100.0001	-0.0001	0.00019
150.000	150.0001	-0.0001	0.00026
200.000	200.0000	0.0000	0.00032

5. OFF CENTER LOADING ERROR



POINT	READING (g)
1	100.0000
2	99.9999
3	100.0001
4	99.9999
5	100.0000
OFF-CENTER LOADING	0.0001

NOTE: THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA
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



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CERTIFICATE No : 21T7487
REFERENCE No : 62011-5

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : INCUBATOR
MANUFACTURER : AQUA LYTIC
MODEL : TC135S
SERIAL No : 0614/000033
ID No : LAB-IB-001
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : PACIFIC LABORATORY CO., LTD.
14/5358 MOO. 14 TAMBOL BANGBUA THONG
AMPHOE BANG NUA THONG, NONTHABURI 11110

CALIBRATED BY : CHAICHARN CH.
CALIBRATION DATE : 06-Aug-21

APPROVED BY : _____
ISSUED DATE : 07-Aug-21
RECEIVED DATE : 06-Aug-21



QUALITY CALIBRATION CO.,LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkae, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

CERTIFICATE No : 21T7487

PAGE : 2 OF 2

Calibration Report

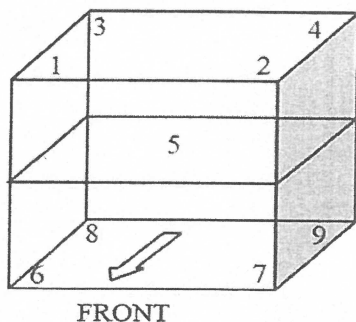
EQUIPMENT : INCUBATOR
MANUFACTURER : AQUA LYTIC
MODEL : TC135S
ID No : LAB-IB-001
RECEIVED DATE : 06-Aug-21
AMBIENT TEMPERATURE : 30 °C ± 1 °C
S/N :
CALIBRATION DATE : 06-Aug-21
RELATIVE HUMIDITY : 50 %RH ± 10 %RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TLAS G-20 BY COMPARISON WITH CALIBRATED RTD Pt100 UNDER NO LOAD CONDITION. THE TEMPERATURE PROBES WERE PLACED ON NINE POINTS AND LOCATED ONE THERMOMETER PROBE IN EACH OF THE EIGHT CORNERS OF THE CHAMBER AND WAS AWAY FROM THE EACH WALL OF 5 cm TO 10 cm. AND PLACED THE NINTH THERMOMETER PROBE WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE CHAMBER. THE UNIFORMITY WAS MEASURED BETWEEN REFERENCE PROBE AND OTHER PROBES AT THE SAME TIME.
2. REFERENCE STANDARD INSTRUMENTS :-

<u>INSTRUMENT</u>	<u>MODEL</u>	<u>SERIAL No</u>	<u>CERTIFICATE No</u>	<u>DUE DATE</u>
1) DATA LOGGER WITH RTD	HYDRA 2635A	7301307	21T6764	10-Jul-22
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) THROUGH QUALITY CALIBRATION CO.,LTD.				

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



GENERAL INFORMATION

Overall Ambient Temperature around the Chamber (°C) variation : 0
Overall Line Voltage (V) variation : 4
Instrument Condition : Normal
Chamber Size (W*L*H): 55*42*70 cm

CHAMBER PERFORMANCE

Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
20.0	20.0	0.28	0.15	0.65

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (± °C)
		#1	#2	#3	#4	Ref. 5	#6	#7	#8	#9	
20.0	20.0	19.95	19.96	19.97	19.95	20.00	19.97	19.94	19.89	19.99	0.38

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.

NOTE 2: LOCATION 5 WAS REFERENCE LOCATION.

NOTE 3 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

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



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REFERENCE No : 62011-2

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT	:	HOT AIR OVEN
MANUFACTURER	:	MEMMERT
MODEL	:	UN55
SERIAL No	:	B214.1879
ID No	:	LAB-OV-001
CONDITION AS RECEIVED	:	USED ITEM
SUBMITTED BY	:	PACIFIC LABORATORY CO., LTD. 14/5358 MOO. 14 TAMBOL BANGBUA THONG AMPHOE BANG NUA THONG, NONTHABURI 11110
CALIBRATED BY	:	<u>CHAICHARN CH.</u>
CALIBRATION DATE	:	<u>06-Aug-21</u>
APPROVED BY	:	<u> </u>
ISSUED DATE	:	<u>07-Aug-21</u>
RECEIVED DATE	:	<u>06-Aug-21</u>

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



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CERTIFICATE No : 21T7484

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : HOT AIR OVEN
MANUFACTURER : MEMMERT
MODEL : UN55
ID No : LAB-OV-001
RECEIVED DATE : 06-Aug-21
AMBIENT TEMPERATURE : 30 °C ± 1 °C
S/N : B214.1879
CALIBRATION DATE : 06-Aug-21
RELATIVE HUMIDITY : 50 %RH ± 10 %RH

CONDITION OF THIS RESULTS OF CALIBRATION

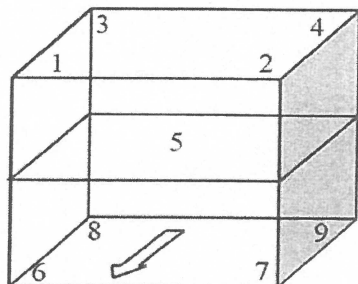
1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TLAS G-20 BY COMPARISON WITH CALIBRATED THERMOCOUPLE TYPE K UNDER NO LOAD CONDITION. THE THERMOCOUPLES WERE PLACED ON NINE POINTS AND LOCATED ONE THERMOCOUPLE IN EACH OF THE EIGHT CORNERS OF THE CHAMBER AND WAS AWAY FROM THE EACH WALL OF 5 cm TO 10 cm. AND PLACED THE NINTH THERMOCOUPLE WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE CHAMBER. THE UNIFORMITY WAS MEASURED BETWEEN REFERENCE PROBE AND OTHER PROBES AT THE SAME TIME.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH TC TYPE K	HYDRA 2635A	7301307	21T6764	10-Jul-22

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) THROUGH QUALITY CALIBRATION CO.,LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



FRONT

GENERAL INFORMATION

Overall Ambient Temperature around the Chamber (°C) variation : 2
Overall Line Voltage (V) variation : 9
Instrument Condition : Normal
Chamber Size (W*L*H): 40*33*40 cm

CHAMBER PERFORMANCE

Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
104.0	104.0	0.42	0.94	1.35
180.0	180.0	0.41	1.13	1.60

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (±°C)
		#1	#2	#3	#4	Ref. 5	#6	#7	#8	#9	
104.0	104.0	103.89	103.72	103.48	103.59	103.70	103.49	103.49	104.20	103.67	0.78
180.0	180.0	179.68	179.51	179.35	179.12	179.36	179.17	179.26	180.03	179.97	1.1

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.

NOTE 2: LOCATION 5 WAS REFERENCE LOCATION.

NOTE 3 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

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



CERTIFICATE No : 21T7486
REFERENCE No : 62011-4

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : WATER BATH

MANUFACTURER : MEMMERT

MODEL : WNB22

SERIAL No : L514.0184

ID No : LAB-WB-001

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : PACIFIC LABORATORY CO., LTD.
14/5358 MOO. 14 TAMBOL BANGBUA THONG
AMPHOE BANG NUA THONG, NONTHABURI 11110

CALIBRATED BY : CHAICHARN CH.

CALIBRATION DATE : 06-Aug-21

APPROVED BY :

ISSUED DATE : 07-Aug-21

RECEIVED DATE : 06-Aug-21



CERTIFICATE No : 21T7486

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : WATER BATH
MANUFACTURER : MEMMERT
ID NUMBER : LAB-WB-001
RECEIVED DATE : 06-Aug-21
AMBIENT TEMPERATURE : 30 °C ± 1 °C
MODEL : WNB22
SERIAL NUMBER : L514.0184
CALIBRATION DATE : 06-Aug-21
RELATIVE HUMIDITY : 50 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO ASTM E715-80 (REAPPROVED 2001) BY COMPARISON WITH CALIBRATED RTD. THE PROBES WERE PLACED ON FIVE POINTS AND LOCATED ONE PROBE IN EACH OF THE FOUR CORNERS OF THE BATH AND PLACED THE FIFTH RTD WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE WATER VOLUME (REFERENCE LOCATION) UNDER NO LOAD CONDITION.
2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT

MODEL

SERIAL No

CERTIFICATE No

DUE DATE

1) DATA LOGGER WITH RTD

2625A

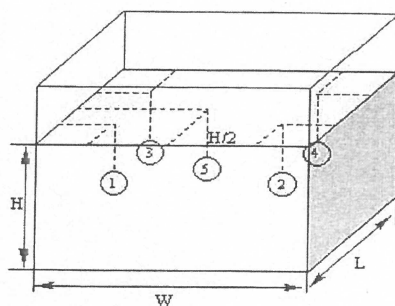
6603614

21T6761

05-Jul-22

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) THROUGH QUALITY CALIBRATION CO.,LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



PROBE INSTALLATION
POSITION IN THE BATH

GENERAL INFORMATION

Overall Variation of Ambient Temperature around the Bath (°C) : 1.5

Overall Variation of Line Voltage (V) : 11

Instrument Condition : Normal

BATH PERFORMANCE

Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
85.0	85.0	0.16	0.12	0.33
95.0	95.0	0.17	0.09	0.35

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations					Uncertainty (± °C)
		#1	#2	#3	#4	Ref. 5	
85.0	85.0	84.59	84.60	84.53	84.58	84.65	0.23
95.0	95.0	94.59	94.58	94.60	94.54	94.63	0.24

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE BATH.

NOTE 2 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

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