



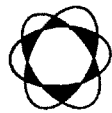
ภาคผนวก จ

เอกสารสอบเทียบเครื่องมือที่ใช้ในการตรวจวิเคราะห์



เมืองอุตสาหกรรมเชิงนิเวศ
พัฒนาก้าวไกล ห่วงใยสิ่งแวดล้อม

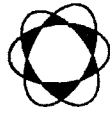
ตารางการสอบเทียบเครื่องมือที่ใช้ในการตรวจวัดและวิเคราะห์



Thai Environmental Technic Limited
บริษัท เทคนิกสิ่งแวดล้อมไทย จำกัด

Item	Description	Parameter	List of Equipment	Equipment No.	Calibration	Next Calibration
1.	Ambient Air	Orifice	ORIFICE TRANSFER STANDARD/Tisch	S/N 0068	19/11/2022	November 2023
			High Volume Air Sampler/TET	S/N TSP-24	01/08/2022	August 2023
		TSP	High Volume Air Sampler/TET	S/N TSP-29	01/08/2022	August 2023
			High Volume Air Sampler/TET	S/N TSP-17	01/08/2022	August 2023
		PM-10	High Volume Air Sampler/TET	S/N TSP-32	01/08/2022	August 2023
			Electronic Balance/METTLER TOLEDO	S/N 1116392227	11/04/2023	April 2024
			ORIFICE TRANSFER STANDARD/Tisch	S/N 0068	19/11/2022	November 2023
			High Volume Air Sampler/TET	S/N PM10-20	01/08/2023	August 2023
			High Volume Air Sampler/TET	S/N PM10-23	01/08/2023	August 2023
			High Volume Air Sampler/TET	S/N PM10-27	01/08/2023	August 2023
			High Volume Air Sampler/TET	S/N PM10-32	01/08/2023	August 2023
			Electronic Balance/METTLER TOLEDO	S/N 1116392227	11/04/2023	April 2024
		NO ₂	CERTIFICATE OF ANALYSIS/Linde	S/N A009625K	18/08/2021	August 2023
			NO _x Analyzer/API 200A	S/N 1978	10/05/2023	November 2023
			NO _x Analyzer/Teledyne T200	S/N 5154	11/05/2023	November 2023
			NO _x Analyzer/Teledyne T200	S/N 5158	12/05/2023	November 2023
		CO	NO _x Analyzer/API 200E	S/N 1281	10/05/2023	November 2023
			Personal Air Sampler/Gilian	S/N 20080703004	22/05/2023	June 2023
			CO Analyzer/HORIBA APMA-360CE	S/N 42088-7001	12/04/2023	October 2023
	SO ₂		CERTIFICATE OF ANALYSIS/Linde	S/N 118310	19/09/2019	September 2023
			SO _x Analyzer/Teledyne TML-50	S/N S02870	11/05/2023	November 2023
			SO _x Analyzer/Thermo 43C	S/N 43C73374373	11/05/2023	November 2023
			SO _x Analyzer/API 100E	S/N 1488	10/05/2023	November 2023
			SO _x Analyzer/API 100A	S/N 1563	12/05/2023	November 2023

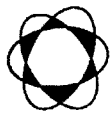
ตารางการสอบเทียบเครื่องมือที่ใช้ในการตรวจวัดและวิเคราะห์



Thai Environmental Technic Limited
บริษัท เทคนิควิเสาสตร์สิ่งแวดล้อมไทย จำกัด

Item	Description	Parameter	List of Equipment	Equipment No.	Calibration	Next Calibration
1.	Ambient air (Cont.)	O ₃	O ₃ Analyzer/Teledyne 400A	S/N 532	17/05/2023	November 2023
			O ₃ Analyzer/Teledyne 400A	S/N 161	16/05/2023	November 2023
			O ₃ Analyzer/Teledyne 400A	S/N 140	17/05/2023	November 2023
			O ₃ Analyzer/Teledyne 400A	S/N 157	17/05/2023	November 2023
		WS & WD	Wind speed and wind direction/Weather Wizard III	S/N WC71006A11	16/01/2023	January 2024
			Wind speed and wind direction/Weather Wizard III	S/N WE00405A32	18/08/2022	August 2023
			Wind speed and wind direction/Weather Wizard II	S/N M20812A66	19/10/2022	October 2023
			Wind speed and wind direction/Weather Wizard III	S/N WC50206A21	16/01/2023	January 2024
2.	Sound Level	Calibrator Leq 24 hr	Sound Level Calibrator/TENMARS TM-100	S/N 181203570	16/01/2023	January 2024
			Integrated Sound Level/ACO TYPE 6226	S/N 110100	25/04/2023	31/05/2023
			Integrated Sound Level/ACO TYPE 6226	S/N 130130	25/04/2023	31/05/2023
			Integrated Sound Level/ACO TYPE 6226	S/N 130131	25/04/2023	31/05/2023
3.	Water		Integrated Sound Level/ACO TYPE 6226	S/N 160203	25/04/2023	31/05/2023
			pH Meter/Horiba	S/N B06D0012	11/07/2022	July 2023
			pH Meter (Temperature)/Horiba	S/N B06D0012	11/07/2022	July 2023
			SPECTROPHOTOMETER/Spectroquant Prove 100	S/N 1618111041	02/05/2023	May 2024
		DO	DO Meter/HORIBA	S/N D75J0013	14/01/2023	January 2024
			Electronic Balance/METTLER TOLEDO	S/N 1116392227	11/04/2023	April 2024
			Electronic Balance/METTLER TOLEDO	S/N 1116392227	11/04/2023	April 2024
			BOD Incubator	ID/N TET.LAB.BOD 05	11/04/2023	April 2024
		Total-P	Spectrophotometer/PerkinElmer	S/N 365K9042909	01/11/2022	November 2023
			Electronic Balance/METTLER TOLEDO	S/N 1116392227	11/04/2023	April 2024
			Spectrophotometer/PerkinElmer	S/N 365K9042909	01/11/2022	November 2023
			Spectrophotometer/PerkinElmer	S/N 365K9042909	01/11/2022	November 2023
		Sulfide	Spectrophotometer/PerkinElmer	S/N 365K9042909	01/11/2022	November 2023
			Atomic Absorption Spectrophotometer	S/N 040S0110503	30/03/2023	September 2023

ตารางการสอบเทียบเครื่องมือที่ใช้ในการตรวจวัดและวิเคราะห์



Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Item	Description	Parameter	List of Equipment	Equipment No.	Calibration	Next Calibration
3.	Water (Cont.)	Cu, Zn NO ₃ -N Total Hg	ICP394/PerkinElmer/OPTIMA8000	S/N 078N1310024C	03/04/2023	October 2023
			Spectrophotometer/PerkinElmer	S/N 365K9042909	01/11/2022	November 2023
			Atomic Absorption Spectrophotometer Model/AAAnalyst 100	S/N 040S0110503	30/03/2023	September 2023
		Ba, Mn Cyanide Cr ⁺⁶ Cr ⁺³	ICP394/PerkinElmer/OPTIMA8000	S/N 078N1310024C	03/04/2023	October 2023
			Spectrophotometer/PerkinElmer	S/N 365K9042909	01/11/2022	November 2023
			Spectrophotometer/PerkinElmer	S/N 365K9042909	01/11/2022	November 2023
			Spectrophotometer/PerkinElmer	S/N 365K9042909	01/11/2022	November 2023
		Cd, Ni, Pb	ICP394/PerkinElmer/OPTIMA8000	S/N 078N1310024C	03/04/2023	October 2023
			Atomic Absorption Spectrophotometer Model/AAAnalyst 600 (Graphite)	S/N 600S5070101	20/01/2023	July 2023
			Model/AAAnalyst 600 (Graphite)			
4.	Soil	Total Coliform Bacteria Fecal Coliform Bacteria Pesticide As, Pb	ICP394/PerkinElmer/OPTIMA8000	S/N 078N1310024C	03/04/2023	October 2023
			Incubator Model INE 500	E.505.0595	10/04/2023	April 2024
			Incubator Model INE 500	E.505.1143	10/04/2023	April 2024
		Cd	Gas Chromatograph/GC7890B	S/N CN16343040	26/09/2022	September 2023
			Atomic Absorption Spectrophotometer Model/AAAnalyst 100	S/N 040S0110503	30/03/2023	September 2023
			Model/AAAnalyst 100			
		Se, Mn, Hg Ni, Zn, Cu	Atomic Absorption Spectrophotometer Model/AAAnalyst 600 (Graphite)	S/N 600S5070101	20/01/2023	July 2023
			Atomic Absorption Spectrophotometer Model/AAAnalyst 100	S/N 040S0110503	30/03/2023	September 2023
			Atomic Absorption Spectrophotometer Model/AAAnalyst 100	S/N 040S0110503	30/03/2023	September 2023
		Cr ⁺⁶	Atomic Absorption Spectrophotometer Model/AAAnalyst 100	S/N 040S0110503	30/03/2023	September 2023
			Spectrophotometer/PerkinElmer	S/N 365K9042909	01/11/2022	November 2023

Certificate of Calibration

Calibration Certification Information			
Cal. Date:	November 19, 2021	Rootsmeier S/N:	438320
Operator:	Jim Tisch	Ta:	294 °K
Calibration Model #:	TE-5025A	Pa:	763.5 mm Hg
		Calibrator S/N:	0068

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4160	3.2	2.00
2	3	4	1	0.9970	6.4	4.00
3	5	6	1	0.8890	7.8	5.00
4	7	8	1	0.8490	8.7	5.50
5	9	10	1	0.6990	12.8	8.00

Data Tabulation

Vstd (m3)	Qstd (y-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)}$ (y-axis)	Va	Qa (y-axis)	$\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)}$ (y-axis)
1.0140	0.7161	1.4271	0.9958	0.7033	0.8776
1.0098	1.0128	2.0182	0.9916	0.9946	1.2411
1.0079	1.1337	2.2564	0.9898	1.1134	1.3875
1.0067	1.1858	2.3666	0.9886	1.1644	1.4553
1.0012	1.4324	2.8542	0.9832	1.4066	1.7551
QSTD					
m=		1.99331	QA		m= 1.24818
b=		-0.00049			b= -0.00030
r=		0.99999			r= 0.99999

Calculations

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

Standard Conditions	
Tstd:	298.15 °K
Pstd:	760 mm Hg
Key	
ΔH:	calibrator manometer reading (in H2O)
ΔP:	rootsmeier 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



High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Tech
ITEM : TSP
Site ID : Bangkok
Serial No : (No. 24)
Date : 1-Aug-22
Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00
Temperature (°C) : 25.0
Corrected Pressure (mm Hg) : 760.0
Average Press. (mm Hg) : 754.5
Corrected Temperature (deg K) : 298.0
Average Temp (°C) : 32.5
Corrected Average (mm Hg) : -
Average Temp (deg K) : -

Calibration Orifice

Make : Tisch
Model : TE-5025A
Serial# : 0068
Qstd Slope : 1.99331
Qstd Intercept : -0.00049
Calibration Due Date : 19-Nov-22

Calibration Information

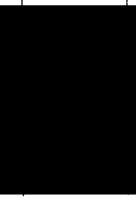
Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 34.7546 Intercept : 1.0714 Corr. Coeff : 0.9897
1	12.00	1.738	60.0	60.00	
2	9.20	1.522	54.0	54.00	
3	7.00	1.328	50.0	50.00	
4	5.00	1.122	40.0	40.00	
5	3.00	0.869	30.0	30.00	

Calculations

Qstd = $1/m \sqrt{\Delta H (H_2O) (Pa/Pstd) (Tstd/Ta)} - b$
IC = $1/m \sqrt{\Delta H (Pa/Pstd) (Tstd/Ta)} - b$

Qstd = standard flow rate
IC = corrected chart response
I = actual chart response

Calibrate By :



Approve By :

m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration (deg K)
Pa = actual pressure during calibration (mm Hg)
Tstd = 298 deg K
Pstd = 760 mm Hg

For subsequent calculation of sampler flow:
 $1/m \sqrt{\Delta H (Tstd/Ta) (Pav/Pstd) (Tav/Ta)} - b$

NOTE: Ensure calibration orifice has been certified within 12 months of use



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High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Tech
ITEM : TSP
Site ID : Bangkok
Serial No : (No.29)
Date : 1-Aug-22
Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00
Temperature (°C) : 25.0
Corrected Pressure (mm Hg) : 760.0
Corrected Temperature (deg K) : 298.0
Average Press. (mm Hg) : 754.5
Average Temp (°C) : 33.7
Corrected Average (mm Hg) :
Average Temp. (Deg K) :

Calibration Orifice

Make : Tisch
Model : TE-5025A
Serial# : 0068
Qstd Slope : 1.99331
Qstd Intercept : -0.00049
Calibration Due Date : 19-Nov-22

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression
1	12.00	1.738	60.0	60.00	Slope : 34.7546
2	9.20	1.522	54.0	54.00	Intercept : 1.0714
3	7.00	1.329	50.0	50.00	Corr. Coeff : 0.9877
4	5.00	1.122	40.0	40.00	
5	3.00	0.869	30.0	30.00	
					# of Observations: 5

Calculations

$$Qstd = 1/m[\sqrt{Pa/Pstd}(Tstd/Ta)]-b$$
$$IC = [1/m(\sqrt{Pa/Pstd}(Tstd/Ta))] - b$$

Qstd = standard flow rate
IC = corrected chart response
I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m(I)[\sqrt{Qstd/Tav}(Pav/760)]-b$$

NOTE: Ensure calibration orifice has been certified within 12 months of use

Calibrate By :

Approve By :



Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Tech
ITEM : TSP
Site ID : Bangkok
Serial No : (No.17)
Date : 1-Aug-22
Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00
Temperature (°C) : 25.0
Corrected Pressure (mm Hg) : 760.0
Corrected Temperature (deg K) : 298.0
Average Press. (mm Hg) : 754.5
Average Temp (°C) : 31.2
Corrected Average (mm Hg) :
Average Temp. (Deg K) :

Calibration Orifice

Make : Tisch
Model : TE-5025A
Serial# : 0068
Qstd Slope : 1.99331
Qstd Intercept : -0.00049
Calibration Due Date : 19-Nov-22

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression
1	12.00	1.738	60.0	60.00	Slope : 34.2901
2	9.60	1.555	54.0	54.00	Intercept : 1.3289
3	7.20	1.346	50.0	50.00	Corr. Coeff : 0.9921
4	5.00	1.122	40.0	40.00	
5	3.00	0.869	30.0	30.00	
					# of Observations: 5

Calculations

$$Qstd = 1/m[\sqrt{Pa/Pstd}(Tstd/Ta)]-b$$
$$IC = [1/m(\sqrt{Pa/Pstd}(Tstd/Ta))] - b$$

Qstd = standard flow rate
IC = corrected chart response
I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m(I)[\sqrt{Qstd/Tav}(Pav/760)]-b$$

NOTE: Ensure calibration orifice has been certified within 12 months of use

Calibrate By :

Approve By :



Thai Environmental Technic Limited
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High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Tech
ITEM : TSP
Site ID : Bangkok
Serial No : (No.32)
Date : 1-Aug-22
Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00
Temperature (°C) : 25.0
Corrected Pressure (mm Hg) : 760.0
Corrected Temperature (deg K) : 298.0
Average Press. (mm Hg) : 754.5
Average Temp (Deg K) : 32.6

Calibration Orifice

Make : Tisch
Model : TE-5025A
Serial# : 0068
Qstd Slope : 1.99331
Qstd Intercept : -0.00049
Calibration Due Date : 19-Nov-22

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression
1	12.00	1.738	60.0	60.00	Slope : 34.5708
2	9.40	1.538	54.0	54.00	Intercept : 1.0653
3	7.20	1.346	50.0	50.00	Corr. Coeff : 0.9926
4	5.00	1.122	40.0	40.00	
5	3.00	0.869	30.0	30.00	
					of Observations: 5

Calculations

$$Qstd = 1/m[\sqrt{(H_2O)(Pa/Pstd)(Tstd/Ta))}] - b]$$
$$IC = [\sqrt{(Pa/Pstd)(Tstd/Ta))}]$$

Qstd = standard flow rate
IC = corrected chart response
I = actual chart response

m = calibrator Qstd slope
b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)
Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m[(I)\sqrt{(298/Tav)(Pav/760))}] - b]$$

NOTE: Ensure calibration office has been certified within 12 months of use

Calibrate By :

Approve By :



Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Tech
ITEM : PM10
Site ID : Bangkok
Serial No : (No. 20)
Date : 1-Aug-22
Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00
Temperature (°C) : 25.0
Corrected Pressure (mm Hg) : 760.0
Corrected Temperature (deg K) : 298.0
Average Press. (mm Hg) : 754.5
Average Temp (Deg K) : 31.2

Calibration Orifice

Make : Tisch
Model : TE-5025A
Serial# : 0068
Qstd Slope : 1.99331
Qstd Intercept : -0.00049
Calibration Due Date : 19-Nov-22

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression
1	12.30	1.760	62.0	62.00	Slope : 35.3232
2	10.00	1.587	56.0	56.00	Intercept : 0.1518
3	7.80	1.401	50.0	50.00	Corr. Coeff : 0.9985
4	4.80	1.099	40.0	40.00	
5	3.00	0.869	30.0	30.00	
					of Observations: 5

Calculations

$$Qstd = 1/m[\sqrt{(H_2O)(Pa/Pstd)(Tstd/Ta))}] - b]$$
$$IC = [\sqrt{(Pa/Pstd)(Tstd/Ta))}]$$

Qstd = standard flow rate
IC = corrected chart response
I = actual chart response

m = calibrator Qstd slope
b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)
Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m[(I)\sqrt{(298/Tav)(Pav/760))}] - b]$$

NOTE: Ensure calibration office has been certified within 12 months of use

Calibrate By :

Approve By :



High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Tech
ITEM : PM10
Site ID : Bangkok
Serial No : (No. 23)
Date : 1-Aug-22
Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00
Temperature (°C) : 25.0
Corrected Pressure (mm Hg) : 760.0
Temperature (deg K) : 298.0
Average Press. (mm Hg) : 754.5
Corrected Average (mm Hg) : -
Average Temp (°C) : 32.3
Average Temp (Deg K) : -

Calibration Orifice

Make : Tisch
Model : TE-5025A
Serial# : 0068
Qstd Slope : 1.99331
Qstd Intercept : -0.00049
Calibration Due Date : 19-Nov-22

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 35.5364 Intercept : 0.2642 Corr. Coeff : 0.9909
1	11.80	1.724	60.0	60.00	
2	9.00	1.505	54.0	54.00	
3	7.00	1.328	50.0	50.00	
4	5.00	1.122	40.0	40.00	
5	3.00	0.869	30.0	30.00	# of Observations: 5

Calculations

$Qstd = 1/m[\text{Sqrt}(H_2O(Pa/Pstd)(Tstd/Ta))] - b]$
 $IC = [1/\text{Sqrt}(Pa/Pstd)(Tstd/Ta)] - b]$
 $Qstd = \text{standard flow rate}$
 $IC = \text{corrected chart response}$
 $I = \text{actual chart response}$
 $m = \text{calibrator Qstd slope}$
 $b = \text{calibrator Qstd intercept}$
 $Ta = \text{actual temperature during calibration (deg K)}$
 $Pa = \text{actual pressure during calibration (mm Hg)}$
 $Tstd = 298 \text{ deg K}$
 $Pstd = 760 \text{ mm Hg}$
For subsequent calculation of sampler flow:
 $1/m(I)[\text{Sqrt}(298/Tav)(Pav/760)] - b]$

NOTE: Ensure calibration orifice has been certified within 12 months of use

Calibrate By :

Approve By :

Location : Thai Environmental Tech
ITEM : PM10
Site ID : Bangkok
Serial No : (No. 27)
Date : 1-Aug-22
Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00
Temperature (°C) : 25.0
Corrected Pressure (mm Hg) : 760.0
Temperature (deg K) : 298.0
Average Press. (mm Hg) : 754.5
Corrected Average (mm Hg) : -
Average Temp (°C) : 32.4
Average Temp (Deg K) : -

Calibration Orifice

Make : Tisch
Model : TE-5025A
Serial# : 0068
Qstd Slope : 1.99331
Qstd Intercept : -0.00049
Calibration Due Date : 19-Nov-22

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 33.4792 Intercept : 3.0890 Corr. Coeff : 0.9940
1	12.60	1.781	62.0	62.00	
2	10.20	1.602	56.0	56.00	
3	7.80	1.401	52.0	52.00	
4	5.20	1.144	42.0	42.00	
5	3.20	0.898	32.0	32.00	# of Observations: 5

Calculations

$Qstd = 1/m[\text{Sqrt}(H_2O(Pa/Pstd)(Tstd/Ta))] - b]$
 $IC = [1/\text{Sqrt}(Pa/Pstd)(Tstd/Ta)] - b]$
 $Qstd = \text{standard flow rate}$
 $IC = \text{corrected chart response}$
 $I = \text{actual chart response}$
 $m = \text{calibrator Qstd slope}$
 $b = \text{calibrator Qstd intercept}$
 $Ta = \text{actual temperature during calibration (deg K)}$
 $Pa = \text{actual pressure during calibration (mm Hg)}$
 $Tstd = 298 \text{ deg K}$
 $Pstd = 760 \text{ mm Hg}$
For subsequent calculation of sampler flow:
 $1/m(I)[\text{Sqrt}(298/Tav)(Pav/760)] - b]$

NOTE: Ensure calibration orifice has been certified within 12 months of use

Calibrate By :

Approve By :



Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Tech
ITEM : PM10
Site ID : Bangkok
Serial No : (No. 32)
Date : 1-Aug-22
Calibrate By : Papat

Site Conditions

Barometric Pressure (mm Hg) : 760.00
Temperature (°C) : 25.0
Average Press. (mm Hg) : 754.3
Average Temp (°C) : 32.1
Corrected Pressure (mm Hg) : 760.0
Temperature (deg K) : 298.0
Corrected Average (mm Hg) :
Average Temp. (Deg K) :

Calibration Orifice

Make : Tisch
Model : TE-S025A
Serial# : 0068
Qstd Slope : 1.99331
Qstd Intercept : -0.00049
Calibration Due Date : 19-Nov-22

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression
1	12.00	1.738	60.0	60.00	Slope : 34.7546
2	5.00	1.522	54.0	54.00	Intercept : 1.0714
3	7.00	1.328	50.0	50.00	Corr. Coeff : 0.9997
4	5.00	1.122	40.0	40.00	
5	3.00	0.869	30.0	30.00	# of Observations: 5

Calculations

$$Qstd = 1/m[\sqrt{(H_2O)(Pa/Pstd)(Tstd/Ta)} - b]$$
$$IC = [Pa/Pstd](Tstd/Ta)]$$

Qstd = standard flow rate
IC = corrected chart response
I = actual chart response

m = calibrator Qstd slope
b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)
Pa = actual pressure during calibration (mm Hg)


Tstd = 298 deg K


Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m[1/(\sqrt{(298/Tav)(Pav/760)} - b)]$$

NOTE: Ensure calibration orifice has been certified within 12 months of use

Calibrate By : 

Approve By : 



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
3344 PATTANAKARN ROAD SOI 13, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-29 FAX. 0-2719-9484



Cert.No.: 23MM160
Page: 1 of 3

Certificate of Calibration

Equipment : Electronic Balance

Manufacturer : Mettler Toledo

Model : AB204

Serial No. : 1116392227

ID No. : TET.LAB.BAL01

Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240

Location : Balance Room


Received order : 10 April 2023

Calibration Date : 11 April 2023

Ambient Temperature : 15 °C to 40 °C

Relative Humidity : 30 % to 90 %

Calibrated by : Khit Ruitanaprapachai

Approved by : 

() Pomhippa Tameyakul

() Malee Burkrua

() Suwit Injai

Issue Date : 25 April 2023

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.



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2304-0146OC-12

Cert.No.: 23MM160
Page: 2 of 3

Procedure used :-

Calibration were conducted using in-house calibration procedure CP-OB01 according to direct measurement method against standard weight.

Condition of this result of calibration

1. Reference standard instruments:-
- 1) Standard Weight Set (E2)
Model 15884
Serial No. 24053
ID No. 70RC007
Test report No. MM-0010-22
Due date 20 Jan 2024
2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This result of calibration was made on requested at the point specified by customer.
4. This certificate is not certified for any commercial transaction.
5. This certification is traceable to the International System of Unit.

Result of calibration () Without Adjustment (*) After Adjustment by External Calibration

Range capacity : 0 g to 210 g Resolution 0.0001 g

Before Adjustment :

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (\pm mg)	Coverage Factor (k)
100	99.9982	+0.0018	0.18	2.00
200	199.9965	+0.0035	0.29	2.00

After Adjustment :

1. Determination of the standard deviation of weighing machine

Applied Weight (g)	Standard Deviation of Reading (g)
100	0.00007
200	0.00007



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2304-0146OC-12

Cert.No.: 23MM160
Page: 3 of 3

Result of calibration

2. Effect of off center loading

A mass of 100 g was placed to various position on the pan.
The weighing machine reading error obtained is given in the table

Position 1 (g)	Position 2 (g)	Position 3 (g)	Position 4 (g)	Position 5 (g)	Maximum difference between off-center and central loading (g)
-0.0002	-0.0002	-0.0003	-0.0003	-0.0002	0.0001

3. Departure from nominal value

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (\pm mg)	Coverage Factor (k)
Unload	0.0000	0.0000	0.14	2.11
0.01	0.0100	0.0000	0.14	2.11
0.1	0.1001	-0.0001	0.14	2.11
0.5	0.5000	0.0000	0.14	2.11
1	1.0001	-0.0001	0.14	2.11
5	5.0000	0.0000	0.14	2.11
10	9.9999	+0.0001	0.14	2.11
25	24.9998	+0.0002	0.15	2.07
50	49.9998	+0.0002	0.16	2.05
100	99.9999	+0.0001	0.18	2.00
200	200.0000	0.0000	0.29	2.00

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 %.

-o-o-

Madu.

a 1158499

Madu.

a 1158498



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Analyzer Calibration Report

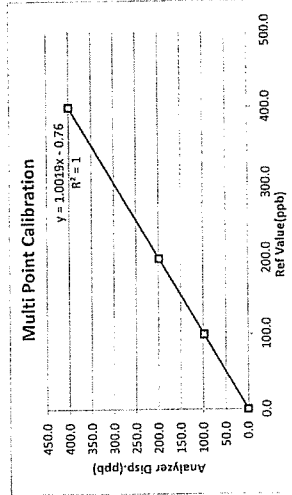
Calibrate Date : 11-May-23
Analyzer Type : NOx
Brand : Teledyne
Model : T200
Serial Number : 5154 (No. 30)
Range : 500 ppb
Temperature (°C) : 25 °C
Barometer (mmHg) : 760.0
Humidity (50±15 %) : 50.0%RH
Dilutor : API M701 S/N 1926
Zero Air : API M701 S/N 1926
Standard gas : A00962 SK

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)			After of Span.(ppb)			% diff of Span
		NOx	NO	NO ₂	NOx	NO	NO ₂	
Zero	0.0	1.3	1.1	0.2	0.0	0.0	0.0	0.0
Span	400.0	395.0	392.0	3.0	400.0	400.0	0.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)			Output Difference		
	NOx	NO	NO ₂	Diff(ppb)	% Diff	Abs (%) Diff
0.0	0.4	0.4	0.0	0.40	0.001	0.10
100.0	99.7	98.5	1.2	-1.50	-0.015	1.50
200.0	199.5	198.7	0.8	-1.30	-0.007	0.65
400.0	401.0	400.7	0.3	0.70	0.002	0.17
Average Diff (%)				0.78		



Calibrate

แก้ไขวันที่ : 00

วันที่อนุมัติ : 02/09/15

เลขที่แบบฟอร์ม : QP-QP16-06

Thai Environmental Technic Limited 1/6 Soi Ramkhamhaeng 145 Khwaeng/Khet Saphan Sung Bangkok 10240 Thailand
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Analyzer Calibration Report

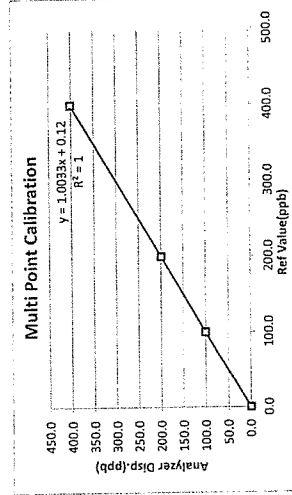
Calibrate Date : 12-May-23
Analyzer Type : NOx
Brand : Teledyne
Model : T200
Serial Number : 5158 (No. 31)
Range : 500 ppb
Temperature (°C) : 25 °C
Barometer (mmHg) : 760.0
Humidity (50±15 %) : 50.0%RH
Dilutor : API M701 S/N 1926
Zero Air : API M701 S/N 1926
Standard gas : A00962 SK

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)			After of Span.(ppb)			% diff of Span
		NOx	NO	NO ₂	NOx	NO	NO ₂	
Zero	0.0	1.1	0.8	0.3	0.0	0.0	0.0	0.0
Span	400.0	398.7	398.1	0.6	400.0	400.0	0.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)			Output Difference		
	NOx	NO	NO ₂	Diff(ppb)	% Diff	Abs (%) Diff
0.0	0.4	0.4	0.0	0.40	0.001	0.10
100.0	101.2	101.2	0.0	1.20	0.012	1.20
200.0	199.5	199.1	0.4	-0.90	-0.005	0.45
400.0	402.3	402.1	0.2	2.10	0.005	0.53
Average Diff (%)				0.73		



Calibrate

แก้ไขวันที่ : 00

วันที่อนุมัติ : 02/09/15

เลขที่แบบฟอร์ม : QP-QP16-06

Thai Environmental Technic Limited 1/6 Soi Ramkhamhaeng 145 Khwaeng/Khet Saphan Sung Bangkok 10240 Thailand
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Test

Thai Environmental Technic Limited
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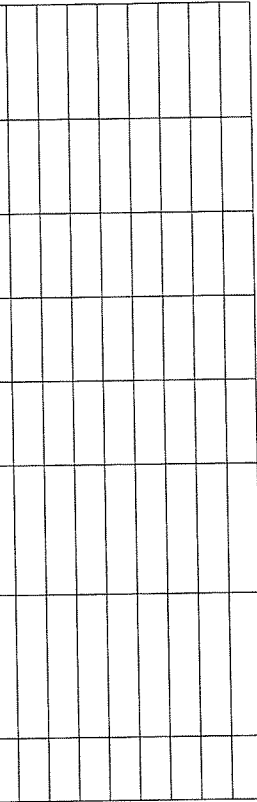
Personal Pump Calibration Report

Equipment Type	:	Personal Pump/Parameter
Equipment Range	:	0.1-7.0 U/min
Calibration Range	:	0.1-4.0 U/min
Calibration Type	:	Drycal
Calibration S/N	:	4491

Calibration Type	:	Dlyca
Calibration S/N	:	4491

[illegible]

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523</
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[illegible]

Remark : Uncertainty Type A

Calibration Date	22 / 05 / 66
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Calibration By_____

Remark : Uncertainty Type A = $\frac{\sigma}{\sqrt{n}}$ SD

: SD	= Standard deviation
: \bar{X}	= Mean

นักสำรวจที่: 00
วันที่ออกบัตร: 02/09/15
เลขที่แบบฟอร์ม: QF-QP16-06



Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

Analyzer Calibration Report

Calibrate Date : 11-May-23
Analyzer Type : SO₂
Brand : Teledyne
Model : TML-50
Serial Number : 902870 (No.19)
Range : 500 ppb

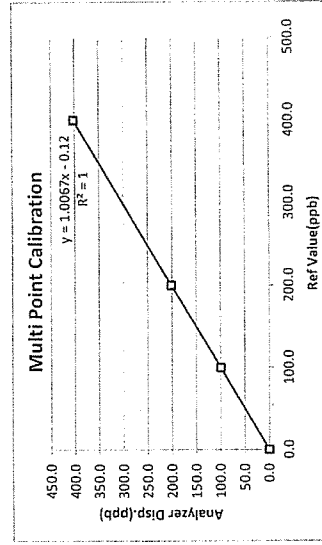
Temperature (°C) : 25 °C
Barometer (mmHg) : 760.0
Humidity (50±15 %) : 50.0 %RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : 118310

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span(ppb)	After of Span(ppb)	Abs% diff of Span
Zero	0.0	2.5	0.0	0.0
Span	400.0	394.0	400.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)	Output Difference	
		Diff (ppb)	Percent Diff
0.0	0.4	0.4	0.00
100.0	99.8	-0.2	0.00
200.0	201.3	1.3	0.01
400.0	402.7	2.7	0.01
Average Diff (%)		0.41	



Calibrate by

แก้ไขวันที่ : 00

วันที่อนุมัติ 02/09/15

เลขที่อนุมัติ : QF-QP16-06

Thai Environmental Technic Limited 1/6 Soi Ramkhamhaeng 145 Khwaeng/Khet Saphan Sung Bangkok 10240 Thailand
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Thai Environmental Technic Limited
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Analyzer Calibration Report

Calibrate Date : 11-May-23
Analyzer Type : SO₂
Brand : Thermo
Model : 43C
Serial Number : 43C737374373 (No.10)
Range : 500 ppb

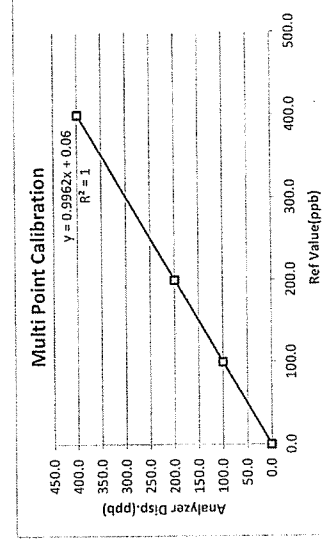
Temperature (°C) : 25 °C
Barometer (mmHg) : 760.0
Humidity (50±15 %) : 50.0 %RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : 118310

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span(ppb)	After of Span(ppb)	Abs% diff of Span
Zero	0.0	0.7	0.0	0.0
Span	400.0	391.0	400.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)	Diff (ppb)	Output Difference	
			Percent Diff	Abs Percent Diff
0.0	0.4	0.4	0.00	0.10
100.0	99.5	-0.5	-0.01	0.50
200.0	198.9	-1.1	-0.01	0.55
400.0	398.8	-1.2	0.00	0.30
Average Diff (%)		0.36		



Calibrate by

แก้ไขวันที่ : 00

วันที่อนุมัติ 02/09/15

เลขที่อนุมัติ : QF-QP16-06

Thai Environmental Technic Limited 1/6 Soi Ramkhamhaeng 145 Khwaeng/Khet Saphan Sung Bangkok 10240 Thailand
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Analyzer Calibration Report

Calibrate Date : 10-May-23
Analyzer Type : SO₂
Brand : API
Model : 100E
Serial Number : 1488 (No. 13)
Range : 500 ppb

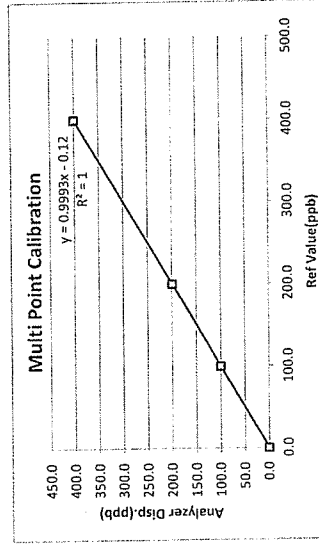
Temperature (°C) : 25 °C
Barometer (mmHg) : 760.0
Humidity (50±15 %) : 50.0 %RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : 118310

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)	After of Span.(ppb)	Abs% diff of Span
Zero	0.0	2.3	0.0	0.0
Span	400.0	394.0	400.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)	Output Difference		
		Diff (ppb)	Percent Diff	Abs Percent Diff
0.0	0.4	0.4	0.00	0.10
100.0	99.8	-0.2	0.00	0.20
200.0	198.7	-1.3	-0.01	0.65
400.0	400.1	0.1	0.00	0.03
Average Diff (%)				
0.29				



Calibrate by: [Redacted]

แก้ไขครั้งที่ : 00

วันที่อนุมัติ 02/09/15

เลขที่แบบฟอร์ม : QF-QM 6-06

Thal Environmental Technic Limited 1/6 Soi Ramkhamhaeng 145 Khwaeng/Khet Saphan Sung Bangkok 10240 Thailand
• Tel : +66(0)2373-7799(Auto) Fax : +66(0)2373-7979 • admin@et1995.com • www.tet1995.com



Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

Analyzer Calibration Report

Calibrate Date : 12-May-23
Analyzer Type : SO₂
Brand : API
Model : 100A
Serial Number : 1563 (No. 15)
Range : 500 ppb

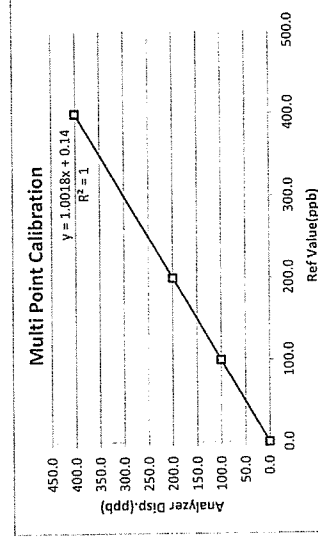
Temperature (°C) : 25 °C
Barometer (mmHg) : 755.0
Humidity (50±15 %) : 50.0 %RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : 118310

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)	After of Span.(ppb)	Abs% diff of Span
Zero	0.0	4.1	0.0	0.0
Span	400.0	382.0	400.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)	Diff (ppb)	Output Difference	
			Percent Diff	Abs Percent Diff
0.0	0.4	0.4	0.00	0.10
100.0	100.5	0.5	0.01	0.50
200.0	199.7	-0.3	0.00	0.15
400.0	401.2	1.2	0.00	0.30
Average Diff (%)				
0.26				



Calibrate by: [Redacted]

แก้ไขครั้งที่ : 00

วันที่อนุมัติ 02/09/15

เลขที่แบบฟอร์ม : QF-QP16-06

Thal Environmental Technic Limited 1/6 Soi Ramkhamhaeng 145 Khwaeng/Khet Saphan Sung Bangkok 10240 Thailand
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TEI

Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

Analyzer Calibration Report

Calibrate Date : 17-May-23
Analyzer Type : O₂
Brand : Teledyne
Model : 400 A
Serial Number : 532 (No.1)
Range : 500 ppb

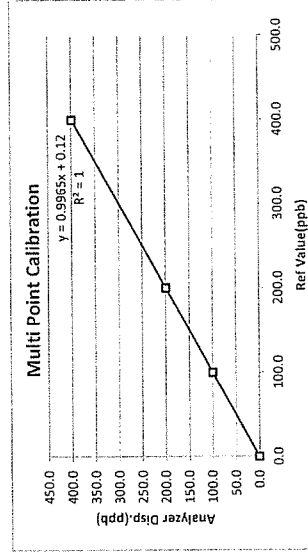
Temperature (°C) : 25°C
Barometer (mmHg) : 760.0
Humidity (50±15 %) : 50.0 %RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span(ppb)	After of Span(ppb)	Abs% diff of Span
Zero	0.0	0.0	0.0	0.0
Span	400.0	388.0	400.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp(ppb)	Output Difference		
		Diff (ppb)	Percent Diff	Abs Percent Diff
0.0	0.5	0.5	0.00	0.00
100.0	99.4	-0.6	-0.01	0.60
200.0	199.2	-0.8	0.00	0.40
400.0	398.9	-1.1	0.00	0.28
Average Diff (%)				0.32



Calibrate by: [Signature]

แก้ไขครั้งที่ : 00

วันที่อนุมัติ 02/09/15

เลขที่แบบฟอร์ม : QF-QP16-06

Thai Environmental Technic Limited 1/6 Soi Ramkhamhaeng 145 Khwaeng/Kiet Saphan Sung Bangkok 10240 Thailand
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TEI

Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

Analyzer Calibration Report

Calibrate Date : 16-May-23
Analyzer Type : O₂
Brand : Teledyne
Model : 400 A
Serial Number : 161 (No.2)
Range : 500 ppb

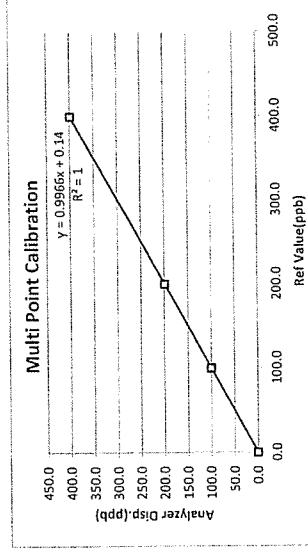
Temperature (°C) : 25°C
Barometer (mmHg) : 760.0
Humidity (50±15 %) : 50.0 %RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span(ppb)	After of Span(ppb)	Abs% diff of Span
Zero	0.0	0.0	0.0	0.0
Span	400.0	411.0	400.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp(ppb)	Diff (ppb)	Output Difference	
			Percent Diff	Abs Percent Diff
0.0	0.5	0.5	0.00	0.00
100.0	99.7	-0.3	0.00	0.30
200.0	198.9	-1.1	-0.01	0.55
400.0	399.1	-0.9	0.00	0.22
Average Diff (%)				0.27



Calibrate by: [Signature]

แก้ไขครั้งที่ : 00

วันที่อนุมัติ 02/09/15

เลขที่แบบฟอร์ม : QF-QP16-06

Thai Environmental Technic Limited 1/6 Soi Ramkhamhaeng 145 Khwaeng/Kiet Saphan Sung Bangkok 10240 Thailand
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Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

Analyzer Calibration Report

Calibrate Date : 17-May-23
Analyzer Type : O₃
Brand : Teledyne
Model : 400 A
Serial Number : 140 (No. 3)
Range : 500 ppb

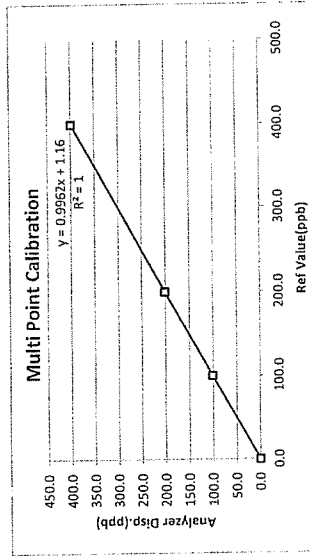
Temperature (°C) : 25°C
Barometer (mmHg) : 760.0
Humidity (50±15 %) : 50.0 %RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span(ppb)	After of Span(ppb)	Abs% diff of Span
Zero	0.0	4.2	0.0	0.0
Span	400.0	386.0	400.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)	Output Difference	
		Diff (ppb)	Abs Percent Diff
0.0	0.5	0.00	0.13
100.0	101.2	1.2	1.20
200.0	201.1	1.1	0.55
400.0	399.2	-0.8	0.20
Average Diff (%)		0.52	



Calibrate by: [Redacted]

แก้ไขวันที่ : 00

วันที่อนุมัติ 02/09/15

เลขที่แบบฟอร์ม : QF-QP16-06

Thai Environmental Technic Limited 1/6 Soi Rangkhamhaeng 145 Khwaeng/Khet Saphan Sung Bangkok 10240 Thailand
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TET

Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

Analyzer Calibration Report

Calibrate Date : 17-May-23
Analyzer Type : O₃
Brand : Teledyne
Model : 400 A
Serial Number : 157 (No. 4)
Range : 500 ppb

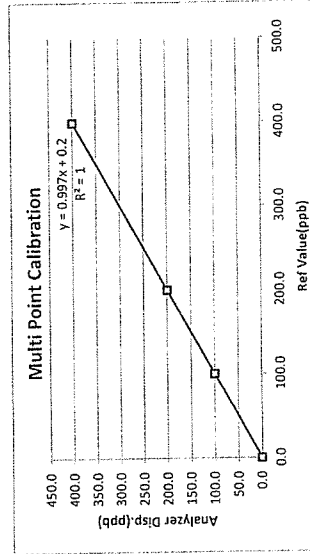
Temperature (°C) : 25°C
Barometer (mmHg) : 760.0
Humidity (50±15 %) : 50.0 %RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span(ppb)	After of Span(ppb)	Abs% diff of Span
Zero	0.0	2.3	0.0	0.0
Span	400.0	385.2	400.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)	Diff (ppb)	Output Difference	
			Percent Diff	Abs Percent Diff
0.0	0.4	0.4	0.00	0.10
100.0	99.7	-0.3	0.00	0.30
200.0	199.5	-0.5	0.00	0.25
400.0	399.1	-0.9	0.00	0.22
Average Diff (%)		0.22		



Calibrate by: [Redacted]

แก้ไขวันที่ : 00

วันที่อนุมัติ 02/09/15

เลขที่แบบฟอร์ม : QF-QP16-06

Thai Environmental Technic Limited 1/6 Soi Rangkhamhaeng 145 Khwaeng/Khet Saphan Sung Bangkok 10240 Thailand
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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 16 January, 2023 Certification No. 018/23

Page : 1 of 2

Object : Wind speed and wind direction
 Manufacturer : Davis Instruments Inc.
 Type : Weather Wizard III
 Serial No. : WC71006A11 ID No. : No.26
 Customer : Thai Environmental Technic Limited.
 1/6 Soi Ramkhamhaeng 145,
 Khwaeng/Khet Saphan Sung, Bangkok 10240.

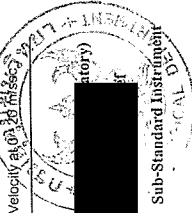
Calibration Condition : Temperature 25.1 °C Barometric Pressure 1010.2 hPa

NATIONAL STANDARD WIND TUNNEL :

: Thermal Anemometer 642 S/N 91563
 : 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 msec
 : Ultrasonic Anemometer Model DA-650-3TV (Sensor TR-90AH)
 Serial Number 110730029 (Sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 20 - 30 msec

Calibrated by :
 Mr. [Redacted]
 Mechanical Engineer



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 018/23

Page : 2 of 2

16 January, 2023

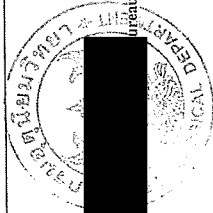
Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H ₂ O	Vacuum inches H ₂ O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.2	0.82
5.00	-	-	-	4.5	0.50
7.00	-	-	-	6.7	0.30
9.02	-	-	-	8.5	0.52
11.01	-	-	-	10.7	0.31
13.01	-	-	-	12.5	0.51
15.01	-	-	-	14.7	0.31
17.02	-	-	-	16.5	0.52
20.02	-	-	-	19.7	0.32

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 :
 Mr. [Redacted]
 Mechanical Engineer



Calibration Certificate



Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 18 August, 2022

Certification No. 296/22

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard III

Serial No. : WE00405A32 ID No. : No.11

Customer : Thai Environmental Technic Limited.

1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung, Bangkok 10240.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1005.8 hPa

NATIONAL STANDARD WIND TUNNEL :

: Thermal Anemometer 642 S/N 91563
: 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

Calibrated by :
Mr. Wa
Mechanical Engineer



The Result of Calibration

Certification No. 296/22

18 August, 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	-	-	-	0.9	0.10	
3.02	-	-	-	2.7	0.32	
5.00	-	-	-	4.9	0.10	
7.00	-	-	-	6.7	0.30	
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 Abort Plotting Board.	
U.S. DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :
[Redacted]
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 19 October, 2022

Certification No. 364/22

Page : 1 of 2

Object : Wind speed and wind direction
 Manufacturer : Davis Instruments Inc.
 Type : Weather Wizard II
 Serial No. : M20812AG6 ID No. : No.21
 Customer : Thai Environmental Technic Limited.
 1/6 Soi Ramkhamhaeng 145,
 Khwaeng/Khet Saphan Sung, Bangkok 10240.

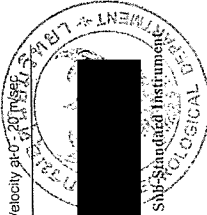
Calibration Condition : Temperature 25.1 °C Barometric Pressure 1011.4 hPa

NATIONAL STANDARD WIND TUNNEL :

: Thermal Anemometer 642 S/N 91563
 : 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 1107/30029 (sensor 120629586)

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

Calibrated by :
 Mr. Vajirapongse
 Mechanical Engineer



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 364/22

19 October, 2022

Page : 2 of 2

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure mmHg H2O	Vacuum mmHg H2O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.9	0.10
7.04	-	-	-	6.7	0.34
9.02	-	-	-	8.9	0.12
11.01	-	-	-	10.7	0.31
13.01	-	-	-	13.0	0.01
15.01	-	-	-	14.7	0.31
17.02	-	-	-	17.0	0.02
20.02	-	-	-	19.7	0.32

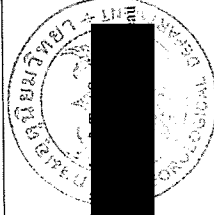
Wind Alot Plotting Board.

U.S. DEPARTMENT OF COMMERCE WEATHER BUREAU

WIND DIRECTION		TESTED WIND DIRECTION	
0		0	
90		90	
180		180	
270		270	

Calibrated by :

Mr. Vajirapongse
 Mechanical Engineer





Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 16 January, 2023 Certification No. 019/23

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard III

Serial No. : WC50206A21 ID No. : No.22

Customer : Thai Environmental Technic Limited.
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung, Bangkok 10240.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1010.5 hPa

NATIONAL STANDARD WIND TUNNEL :

: Thermal Anemometer 642 S/N 91563

: 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 20 m/sec

Calibrated

Mr. Watcharaporn

Mechanical Engineer

Sub-Standard Instrument



The Result of Calibration

Certification No. 019/23

16 January, 2023

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	Correction m/sec
1.00	-	-	0.9	0.10
3.02	-	-	2.7	0.32
5.00	-	-	4.9	0.10
7.00	-	-	6.7	0.30
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	-	-	19.9	0.12

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 : Mr. Watcharaporn

Mechanical Engineer

Sub-Standard Instrument



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0197

MTC No. EEL. BP. 60/0166

CALIBRATION CERTIFICATE

Submitted by : THAI ENVIRONMENTAL TECHNIC LIMITED.
Address : 1/6 Soi Rankhamhaeng 145, Khwaeng/Khet Saphanung, Bangkok 10240.
Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
: Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakarn 10280.

Instrument Calibrated :
Description : Sound Calibrator
Manufacturer : Temars
Model : TM-100
Serial No. : 181203570

Ambient Environment
Temperature : $(23 \pm 3) ^\circ\text{C}$
Relative Humidity : $(50 \pm 15) \%$
Ambient Pressure : $(101.325 \pm 1.500) \text{ kPa}$

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

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 : 10 Jan. 2023
Date of Calibration : 16 Jan. 2023

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.

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 : tump@tistr.or.th Website: www.tistr.or.th

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

FM.BL.MTC.002 Rev.4

1/3



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0197

MTC No. EEL. BP. 60/0166

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 20 μPa at 1000 Hz
Acoustic Output in dB re 20 μPa , Corrected to Reference Conditions : 101.325 kPa, 23.0 $^\circ\text{C}$ and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit
1/2 inch Bruel&Kjaer 4180	94.26	0.26	± 0.10	IEC60942:2003 Class 2 $\pm 0.75 \text{ dB}$

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit
1/2 inch Bruel&Kjaer 4180	989.3	-10.7	± 1.5	IEC60942:2003 Class 2 $\pm 2.0\%$

3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit
1/2 inch Bruel&Kjaer 4180	2.20	± 0.50	IEC60942:2003 Class 2 $\pm 4.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Date of Calibration : 16 Jan. 2023

2/3

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.

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 : tump@tistr.or.th Website: www.tistr.or.th

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

FM.BL.MTC.002 Rev.4



730-TSTR

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-660197

MTC No. EEL-BP-60/0166

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 2
1/2 inch Brüel&Kjaer 4180	113.96	-0.04	± 0.10	±0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Brüel&Kjaer 4180	985.1	-14.9	± 1.5	±2.0%

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Brüel&Kjaer 4180	2.60	± 0.60	±4.0%

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

Approved by :

Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre

Date of Calibration : 16 Jan. 2023

Date of Issue : 18 Jan. 2023

End of Certificate

Ref : 2011266011000062001

3 / 3

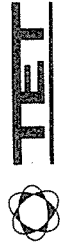
The results relate only to the items tested/calibrated or value assigned.
Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FMBL/MTC.002 Rev.4

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Sol 1C Bangkok Industrial Estate, Sukhumvit Road,
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Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : ntc@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



Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type : Sound Level Meter
Calibrator : TENMARS Sound Calibrator TM-100
Standard : IEC 60942
Accuracy : 94.0 ±0.3 dB and 114.0±0.5 dB
Frequency : at 1,000 Hz ±1%
Calibrator Serial NO. : 181203570
Calibration Date : 25-Apr-2023
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23±3)°C : 25 °C
Relative Humidity(50±15 % : 50.0 % RH
Dued Date of Calibrate : 31-May-2023

Item	Instrument Calibrated		Reference Acoustic dB	Before Adjust			After Adjust ± dB	Deviation ± dB	Result Calibrate
	Brand	Model		ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3			
31	ACO	6226	110098	94.2	94.2	94.2	94.0	0.2	PASS
32	ACO	6226	110105	93.9	93.9	93.9	94.0	0.1	PASS
33	ACO	6226	110086	94.1	94.1	94.1	94.0	0.1	PASS
34	ACO	6226	110099	93.9	93.9	93.9	94.0	0.1	PASS
35	ACO	6226	110097	94.3	94.3	94.3	94.0	0.3	PASS
36	ACO	6226	110102	94.2	94.2	94.2	94.0	0.2	PASS
37	ACO	6226	110101	93.9	93.9	93.9	94.0	0.1	PASS
38	ACO	6226	110106	93.9	93.9	93.9	94.0	0.1	PASS
39	ACO	6226	110104	94.1	94.1	94.1	94.0	0.1	PASS
40	ACO	6226	110100	96.7	96.7	96.7	94.0	0.3	PASS

Calibration By

Approve by

The Environmental Technic Limited 1/6 Soi Raminbhaeng 145 Khwaeng/Khet Saphan Sung Bangkok 10240 Thailand
• Tel : +66(0)2373-7798(Auto) Fax : +66(0)2373-7979 • admin@tetr1995.com • www.tetr1995.com



Thai Environmental Technic Limited
บริษัท เทคนิสิ่งแวดล้อมไทย จำกัด

Thai Environmental Technic Limited
บริษัท เทคนิสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type : Sound Level Meter
Calibrator : TENMARS Sound Calibrator TM-100
Standard : IEC 60942
Accuracy : 94.0 ±0.3 dB and 114.0±0.5 dB
Frequency : at 1,000 Hz ±1%
Calibrator Serial NO. : 181203570

Calibration Date : 25-Apr-2023
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23±3)°C : 25 °C
Relative Humidity(50±15 %) : 50.0 % RH
Dued Date of Calibrate : 31-May-2023

Item	Instrument Calibrated		Reference Acoustic dB	Before Adjust			After Adjust ± dB	Deviation ± dB	Result Calibrate
	Brand	Model	Serial NO.	ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3			
41	ACO	6226	130127	94.1	94.1	94.1	94.0	0.0	PASS
42	ACO	6226	130128	94.1	94.1	94.1	94.0	0.1	PASS
43	ACO	6226	130129	94.1	94.1	94.1	94.0	0.1	PASS
44	ACO	6226	130130	94.1	94.1	94.1	94.0	0.1	PASS
45	ACO	6226	130131	93.9	93.9	93.9	94.0	0.0	PASS
46	ACO	6236	112029	94.1	94.1	94.1	94.0	0.1	PASS
47	ACO	6236	152073	94.1	94.1	94.1	94.0	0.1	PASS
48	ACO	6236	152074	94.0	94.0	94.0	94.0	0.0	PASS
49	ACO	6236	152075	93.9	93.9	93.9	94.0	0.1	PASS
50	ACO	6236	152076	94.1	94.1	94.1	94.0	0.1	PASS

Calibration

Approve by



Thai Environmental Technic Limited
บริษัท เทคนิสิ่งแวดล้อมไทย จำกัด

Thai Environmental Technic Limited
บริษัท เทคนิสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type : Sound Level Meter
Calibrator : TENMARS Sound Calibrator TM-100
Standard : IEC 60942
Accuracy : 94.0 ±0.3 dB and 114.0±0.5 dB
Frequency : at 1,000 Hz ±1%
Calibrator Serial NO. : 181203570

Calibration Date : 25-Apr-2023
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23±3)°C : 25 °C
Relative Humidity(50±15 %) : 50.0 % RH
Dued Date of Calibrate : 31-May-2023

Item	Instrument Calibrated		Reference Acoustic dB	Before Adjust			After Adjust ± dB	Deviation ± dB	Result Calibrate
	Brand	Model	Serial NO.	ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3			
51	ACO	6236	152077	94.2	94.2	94.2	94.0	0.2	PASS
52	ACO	6226	150142	94.1	94.1	94.1	94.0	0.1	PASS
53	ACO	6226	160085	93.9	93.9	93.9	94.0	0.1	PASS
54	ACO	6226	160086	93.8	93.8	93.8	94.0	0.2	PASS
55	ACO	6226	160087	94.0	94.0	94.0	94.0	0.0	PASS
56	ACO	6226	160088	94.1	94.1	94.1	94.0	0.1	PASS
57	ACO	6226	160089	94.0	94.0	94.0	94.0	0.0	PASS
58	ACO	6226	180143	94.1	94.1	94.1	94.0	0.1	PASS
59	ACO	6226	160203	93.8	93.8	93.8	94.0	0.2	PASS
60	ACO	6226	160204	94.1	94.1	94.1	94.0	0.1	PASS

Calibration

Approve by



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
53/44 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL: 0-2717-3000-27 FAX: 0-2719-9484



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
53/44 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL: 0-2717-3000-27 FAX: 0-2719-9484

Certificate of Calibration

Cert. No.: 22CHO410
Page.: 1 of 2

Equipment : pH Meter
Manufacturer : Horiba
Model : LAQUA-PH1300
Serial No. : B06D0012
ID No. :
Condition As-Received:
Received Date : 11 July 2022
Calibration Date : 11 July 2022
Reference : 2207-0243OC-7
Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng, 145
Khwaeng/Khet Saphan Sung,
Bangkok 10240

Calibration Place : Laboratory (Thai Environment Technic Limited)
Ambient Temperature : (25.2 - 25.4) °C
Relative Humidity : (50.8 - 51.3) %
Calibration Procedure : In - house method :
- CP-0CH2 by direct measurement with standard
voltage calibrator and direct measurement
with certified reference material (CRM)

Calibrated by : Krisda Malee

Approved by :
(/) Malee Buikrua
() Sathip Meangmai

Issue Date : 19 July 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.

A 0042417



Cert. No.: 22CHO410
Page.: 2 of 2

Condition of this calibration result

1. Reference Standard Instrument :-
Instrument Serial No. ID No. Cert. No. Due Date
1) Document Process Calibrator 46530031 130RC098 21E3245 07 Oct 2022
2) Digital Thermometer 130RC112 21T2118 16 Nov 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 1.681 CPA chem 754027 28 Jun 2023
pH 4.008 CPA chem 794120 14 Feb 2024
pH 6.866 CPA chem 754029 28 Jun 2023
pH 9.181 CPA chem 766823 04 Sep 2022
*pH 12.44 Hach Lenge GmbH C02796 15 Dec 2022

3. This certificate is valid only to the item calibrated on date and place of calibration.
- Calibration Results
Function : mV Measurement
Performing standard curve by Fluke at pH (1.68,4,7,10)

Calibration Results

Function : mV Measurement

Performing standard curve by Fluke at pH (1.68,4,7,10)

Unit Under Calibration	Nominal Value	Standard pH Buffer Solution	Standard Voltage Input mV	Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor k
				mV	pH		
pH Meter S/N.: B06D0012	1.680	1.681	314.73	314.7	1.694	0.058	2.00
	4.000	4.008	177.48	177.5	4.008	0.058	2.00
	6.860	6.866	8.28	8.3	6.860	0.058	2.00
	7.000	9.181	0.0	0.0	7.000	0.058	2.00
	9.180	*12.44	-128.97	-128.9	9.188	0.058	2.00
Function : pH Measurement				-177.48	-177.4	0.058	2.00

Function : pH Measurement

Performing four buffers standard curve by using buffer nominal pH (1.68,4,7,9)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (±)	Coverage factor k
pH Electrode S/N.: 9X9M0055	1.681	1.681	295.6	0.0050	2.00
	4.008	4.007	159.9	0.0047	2.00
	6.866	6.866	-6.9	0.0084	2.00
	9.181	9.181	-139.9	0.014	2.00
	*12.44	12.440	-314.5	0.056	2.00

Remark : * : Not NSC-ONSC Accredited

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-

1010

a 1090860



Certificate of Calibration

Equipment: SPECTROPHOTOMETER
Model: Spectroquant Prove 100
Serial No. (or ID.): 1618111041
Manufacturer: Merck
Condition: In Condition

Customer: Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145, Khwaeng Saphan Sug,
Khet Saphan Sung, Bangkok 10240 Thailand

Environment Condition: Temperature 27.7 °C ± 0.3 °C
Humidity 59.5 %RH ± 1.7 %RH

Calibration Place: Thai Environmental Technic Limited (Laboratory)
1/6 Soi Ramkhamhaeng 145, Khwaeng Saphan Sug,
Khet Saphan Sung, Bangkok 10240 Thailand

Calibration By: Mr.Siwapan Srijan
Calibration Date: 02 May 2023
The Method used: In house method, CAL-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. 105931 and 105898
The standard for Photometric Certificate No. 105940
The standard for Stray light Certificate No. 101040

This certificate is traceable 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 DKSH Technology Limited.

DKSH Technology Limited
2533 Sukhumvit Road, Bangkok, Thailand 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Delivering Growth - In Asia and Beyond.

CAL-FM-C06-15: 12 Sep 2022



Certificate No.: C06230177
Issued Date: 02 May 2023
Job No.: KSPR2306590
Page: 1 of 3



Certificate No.: C06230177

Page 2 of 3

Calibration Results: Without Adjustment

Wavelength Accuracy (nm), The spectral bandwidth of Std at 4 nm and UUC at 4 nm

Standard Wavelength	Unit Under Calibration	Correction	Uncertainty
418.48	418.9	-0.42	0.13
536.90	536.8	0.10	0.13
637.94	638.1	-0.16	0.13
748.28	748.3	-0.02	0.13
807.16	807.0	0.16	0.13

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
420 nm	0.0000	0.000	0.0000	0.0045
	0.5890	0.591	-0.0020	0.0045
	0.7604	0.762	-0.0016	0.0045
	1.0241	1.028	-0.0039	0.0045
440 nm	0.0000	0.000	0.0000	0.0045
	0.5782	0.579	-0.0008	0.0045
	0.7430	0.745	-0.0020	0.0045
	1.0016	1.005	-0.0034	0.0045
465 nm	0.0000	0.000	0.0000	0.0045
	0.5283	0.530	-0.0017	0.0045
	0.6854	0.688	-0.0026	0.0045
	0.9509	0.953	-0.0021	0.0045
546.1 nm	0.0000	0.000	0.0000	0.0045
	0.5457	0.545	0.0007	0.0045
	0.6944	0.694	0.0004	0.0045
	0.9965	0.996	0.0005	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.5837	0.582	0.0017	0.0045
	0.7223	0.721	0.0013	0.0045
	1.0935	1.091	0.0025	0.0045
635 nm	0.0000	0.000	0.0000	0.0045
	0.5675	0.566	0.0025	0.0045
	0.6900	0.689	0.0010	0.0045
	1.0862	1.085	0.0012	0.0045

DKSH Technology Limited
2533 Sukhumvit Road, Bangkok, Thailand 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Delivering Growth - In Asia and Beyond.

CAL-FM-C06-15: 12 Sep 2022

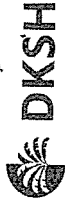


Calibration Results:
Without Adjustment

Stray light *	UUC: Wavelength (nm)	UUC: Transmission (%T)	Absorbance (A)
Standard: cut-off	391.9	1.13	1.947
391.94 +/- 0.11 nm			

* Calibration Marked "Not TISI Accredited" in this Certificate have been included for completeness.

The End of Certificate



ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

ชนิดเครื่องมือ: SPECTROPHOTOMETER รุ่น: Spectroquant Prove 100 เลขที่ใบงาน: KSPR2306590
หมายเลขเครื่อง: 1618111041

ตรวจสอบ (วัน)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
02 May 2023	ไม่ปกติ		02 May 2023	ไม่ปกติ	
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์ ปิด - เปิด เครื่อง (On-Off Switch)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	Spectrophotometer			
<input type="checkbox"/>	<input type="checkbox"/>	6. แรงดันไฟฟ้า (Battery Backup) >= 2.5 VDC	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. ตัวหมุนเลือกความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. ความยาวคลื่น (Wavelength Check)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	9. แหล่งกำเนิดแสง (UV < 3,000 hour)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	169 Hours
<input type="checkbox"/>	<input type="checkbox"/>	11. ช่องวัดหลายตัวอย่าง (Carousel Module)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	pH Meter and Conductivity Meter			
<input type="checkbox"/>	<input type="checkbox"/>	12. อิเล็กโทรด (Electrode and Connection Cable)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	13. ระดับสารละลายใน Electrode (Level KCl)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	14. ฝาปิดกันปลาย Electrode (Dust Protection Hood)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	15. ขาตั้งอิเล็กโทรด (Stand)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	Turbidimeter			
<input type="checkbox"/>	<input type="checkbox"/>	16. ค่าความขุ่นต่ำสุด (No Sample)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	17. ระดับการส่องสว่างของแสง (>= 2.5 ไม่นาน 3.0)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	Automatic titrator			
<input type="checkbox"/>	<input type="checkbox"/>	18. สภาพ Piston Burettes	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	19. Function Rinsing and Dosing	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	20. ระบบท่อสายยางและอุปกรณ์ประกอบ	<input type="checkbox"/>	<input type="checkbox"/>	

เพิ่มเติม/ข้อแนะนำ :

Mr.Siwapan Srijan
Service Engineer



Certificate of Calibration

Page : 1 of 3

Certificate Number : SPR23010143-6

Customer : Thai Environmental Technic Limited.

1/6 Soi Ramkhamhaeng 145, Khwaeng Saphan Sung, Khet Saphan
Sung, Bangkok 10240, Thailand.

Equipment Name : DO Meter
Manufacturer : Horiba
Model : OM-71G
Serial Number : D75J0013
ID. Number : No.08

Environmental Conditions
Ambient Temperature : 23 °C ± 2 °C Received Date : 13 Jan 2023
Relative Humidity : 50 % ± 15 % Calibration Date : 14 Jan 2023
Location of Calibration : In-Lab Recommend Due Date : 14 Jan 2024
Calibration Procedure : In-House Method Date of Issue : 15 Jan 2023

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.Pitak Srisutiam
Calibration Officer

Approved

Authorized Signatory

SP-FM-04-15 rev.0



Calibration Report

Certificate Number : SPR23010143-6

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due Date
Zero Oxygen Solution	H17040L	Lot. S0066/21	01B24	31 Jan 2027
Electronic Balance	N/A	14246789	SPR22110015-7	10 Nov 2023
Standard Weight Set	Class E2	B746971965	C02221902	16 Sep 2023

Traceability

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

HANNA - Hanna Instruments (Thailand) Ltd.

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

SPC - SPC Calibration Center Co.Ltd.



Result of Calibration

Page : 3 of 3

Certificate No.: SPR23010143-6

Function : Dissolved Oxygen Permanence Test					Unit : mg/L
Range	Actual Standard	UUC. Reading	Error	Uncertainty (±)	
0-40	0.3	0.23	-0.07	0.13	
	8.3	8.15	-0.15	0.13	

Note:

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

Measurement Uncertainty

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



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL: 0-2717-3000-29 FAX: 0-2719-9484



Cert. No.: 23TM673
Page : 1 of 3

Certificate of Calibration

Equipment : BOD Incubator
Manufacturer : Accuplus
Model : i250
Serial No. : 0408-0115-0008
ID No. : TET.LAB.BOD05
Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240
Location : Laboratory (Thai Environmental Technic Limited)
Received Order : 10 April 2023
Calibration Date : 11 April 2023
Ambient Temperature : (28 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Khit Ruttanaprapachai
Approved by :
() Pornthippa Tameyakul
() Malee Butkruea
() Suwit Imjai
Issue Date : 25 April 2023

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.



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2304-01460C-2
Procedure Used :-

Calibration was conducted using calibration procedure CP-QT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).
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	34972A	MY57013711	22LM93	02 Jul 2023

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

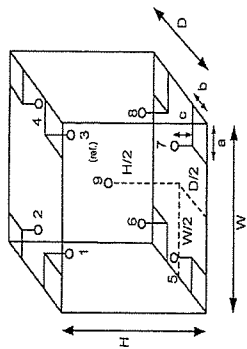
3. This certification is traceable to the International System of Unit.

Result of Calibration :-

(*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available



Probe Installation Details :

Position	Ref. Std. ID No.:
1	18-18RTD-01
2	18-18RTD-02
3	18-18RTD-03
4	18-18RTD-04
5	18-18RTD-05
6	18-18RTD-06
7	18-18RTD-07
8	22-18RTD-08
9 (ref.)	18-18RTD-09

Dimension of Chamber :

Parameter	Value
a =	10 cm
b =	10 cm
c =	10 cm
D =	0.48 m
W =	0.50 m
H =	1.1 m
Capacity =	0.26 m ³

Malu

a 1158205



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2304-01460C-2
Result of Calibration :-
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
20.0	19.8	19.7	0.54	0.37	1.1	2

Calibration Point (°C)	Measured Temperature (°C)								Uncertainty (±°C)
	1	2	3	4	5	6	7	8	
20.0	20.121	20.227	19.983	20.098	19.992	19.953	19.936	19.914	20.048
									0.72

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

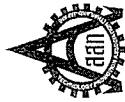
Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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 %.

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Malu

a 1158204



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
53/44 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



NSC-T&T-1817025
CALIBRATION 0008

Cert. No.: 22CHO625
Page.: 1 of 3

Certificate of Calibration

Equipment : Spectrophotometer
Manufacturer : PerkinElmer
Model : Lambda 365
Serial No. : 365K9042909
ID No. : -

Condition As-Received:
Received Date : 01 November 2022
Calibration Date : 01 November 2022
Reference : 2211-0007OC-5
Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240

Calibration Place : Laboratory (Thai Environment Technic Limited)
Ambient Temperature : (24.9 - 24.4) °C (On-Site)
Relative Humidity : (54 - 52) % (On-Site)
Calibration Procedure : In - house method :
CP-0CH4 based on ASTM E 275-01

Calibrated by : Uthen Kankawi
Approved by :
Approved Signatory

(/) Malee Butkruea
() Sathip Meangmai
() Warakorn Lemgagrakul

Issue Date : 10 November 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.

A 0047052



Cert. No.: 22CHO625
Page : 2 of 3

Condition of calibration result

1. Reference Standard Material :

Material	Serial No.	Certificate No.	Due date
1. Absorbance Standard set	39130	106269	10 Oct 2024
2. Wavelength Standard set	29829	94776	02 Sep 2023
3. Wavelength Standard set	29829	94777	02 Sep 2023
4. Stray Light Standard set	32629	9112980	03 Aug 2024

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

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

- National Physical Laboratory (NPL), The United Kingdom of Great Britain and Northern Ireland
- National Institute of Standards and Technology (NIST), The United States of America

4. Spectral Bandwidth : 1 nm
Scan Speed : 30 nm/min

Calibration Results : without adjustment

Wavelength Accuracy

Certified Values of Reference Material (nm)	UUC Reading (nm)	Uncertainty of Measurement (± nm)	Coverage Factor k
418.53	418.32	0.12	2.00
536.52	536.61	0.12	2.00
638.00	637.96	0.12	2.00
684.50	684.48	0.12	2.00
879.41	879.39	0.12	2.00

a 1134411

Cert. No.: 22CHO625
Page: 3 of 3



Wavelength (nm)	Certified Values of Reference Material (Abs)	UUC Reading (Abs)	Uncertainty of Measurement (\pm Abs)	Coverage Factor k
420.0	Zero	0.0000	0.0028	2.00
	0.5796	0.5788	0.0028	2.00
	0.7105	0.7095	0.0028	2.00
	1.0186	1.0179	0.0028	2.00
546.1	Zero	0.0000	0.0028	2.00
	0.5281	0.5258	0.0028	2.00
	0.6962	0.6945	0.0028	2.00
	0.9984	0.9956	0.0028	2.00
635.0	Zero	0.0000	0.0028	2.00
	0.5699	0.5684	0.0028	2.00
	0.7606	0.7590	0.0028	2.00
	1.0927	1.0904	0.0028	2.00

* Straylight at 280.05 nm \pm 0.11 nm	Reading at 280.05 nm \pm 0.11 nm
Abs	2.0728
%T	0.8299

- Each individual filter is measured against the empty filter holder (blank) used to zero the spectrophotometer
- Cut-off wavelength of stray light reference material (Potassium Iodide) at wavelength 280.05 nm \pm 0.11 nm
- Result = Pass, if Absorbance > 2.00 Abs and Transmission < 1.0 %T at Wavelength 280.05 nm \pm 0.11 nm
- * : Not NSC-ONSC Accredited

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Male.

a 1134410

TH ONE SOURCE Co., Ltd. 33/119, T.Ladsawai, A.Lam Luk Ka, Pathum Thani 12150, Thailand

Page 1 of 4

Customer : บริษัท เทคโนโลยีสิ่งแวดล้อมไทย	Date Tested:
จำกัด	30-มี.ค.-66
Address : 1/6 ขอมรามคำแหง 145,	Recommendation Recertification
แขวงสะพานสูง, เขตสะพานสูง,	Period 6 Months
กรุงเทพมหานคร 10240 TH	Recertification Due: 29-ก.ย.-66
User Name: คุณ กิตติศักดิ์ เนื่องงาม	Date Last Certified: 3-ต.ค.-65
Phone: 02-3737799	Visit Number: 1 of 2
E-mail: phornvip.p@tet11995.com	TH ONE SOURCE Phone: 081-7316733
ketsarin.c@tet11995.com	E-mail: thonesource@gmail.com

CONFIGURATION TESTED

MODEL	SERIAL NUMBER	SOFTWARE
AAnalyst 100	040S0110503	AA WinLab 3.2
TEST STANDARD USED	PART NUMBER	
Copper	N9300183	
Filter 0.2 %	MG0-057	



MAINTENANCE REPORT

ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAnalyst 100

SERIAL NUMBER 040S0110503 DATE TESTED 30-11-66

1. OPTIC CHECKS

- A. Optical alignment condition (if necessary) ☐ OK
- B. Condition of Mirrors,Lenses etc.(if necessary) ☐ OK
- C. D2,HCL beam adjust (if necessary) ☐ OK

2. GAS SYSTEM CHECKS

- A. Leak test all internal and external gas box joints ☐ OK
- B. All gas box safety features ☐ OK
- C. Burner system including nebulizer and all o-ring and gasket ☐ OK
- D. Drain system (safety) ☐ F

3. ELECTRONICS CHECKS

- A. Power Supplies
- | | |
|---------------------------|-------------|
| + 5.00 Vdc \pm 0.2 Vdc | + 5.02 Vdc |
| + 11.50 Vdc \pm 0.2 Vdc | + 11.48 Vdc |
| + 15.00 Vdc \pm 1.0 Vdc | +14.99 Vdc |
| - 15.00 Vdc \pm 1.0 Vdc | -15.06 Vdc |
| + 35.00 Vdc \pm 3.0 Vdc | +35.13 Vdc |

4. WAVELENGTH ACCURACY TEST

- A. Zn Lamp wavelength 213.9 nm \pm 0.3 nm. 213.78 nm.
- B. Fe Lamp wavelength 248.3 nm \pm 0.3 nm. 248.20 nm.
- C. Cu Lamp wavelength 324.8 nm \pm 0.3 nm. 324.83 nm.

Page 2 of 4



MAINTENANCE REPORT

ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAnalyst 100

SERIAL NUMBER 040S0110503

DATE TESTED 30-11-66

5. PERFORMANCE TESTS

- * A. Neutral density filter checks with Copper (324.8 nm)
Neutral Density Filter 0.2 \pm 10%
0.180 SPEC. 0.173 RESULTS Abs.

B. AA Baseline noise test with Copper (324.8 nm)

- Integration time = 0.5 seconds
Replicates = 99 times
Standard Deviation \leq 0.001 0.000

C. Flame sensitivity with Copper (324.8nm)

- (5 mg/L Cu Standard a read time of 10 seconds
10 replicates, standard burner)
Stainless steel nebulizer
 \geq 0.25 0.285 Abs.

%RSD \leq 0.3 0.18 %

Page 3 of 4



MAINTENANCE REPORT
ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL
AAAnalyst 100

SERIAL NUMBER 040S0110503 DATE TESTED 30-5.9.-66

Remarks :

This is to certify that the above tests have been performed and the configuration tested

☒ meets
☐ does not meet

This certificate does not modify PerkinElmer's standard terms and condition of sale, including warranty terms.

Service Department TH ONE SOURCE CO., LTD.



Certificate of Training

This is to certify that

Mr. Krungchai Treevichien

Has successfully completed

Atomic Absorption 100/300 Service Training

17 September, 2007 TO 21 September, 2007

21 September 2007
Date





WO-02273746/2023

MAINTENANCE REPORT AND TEST CERTIFICATE OPTIMA 8000

Customer : บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด
Address : 1/6 ซอยรามคำแหง 145 แขวงสะพานสูง เขตสะพานสูง กรุงเทพมหานคร 10240
User Name: Khun Natapong
Phone: 02-3737799
Fax: 02-3737799

Date Tested: April 3, 2023
Recommendation Recertification Period: 6 Months
Recertification Due: October 3, 2023
Date Last Certified: October 4, 2022
Visit Number: 1 of 2
PerkinElmer Phone: 02-719-6420 ext 203
PerkinElmer Fax: 02-318-5597

CONFIGURATION TESTED

MODEL
OPTIMA 8000
S10

ACCESSORIES/COMPONENT NOT INCLUDED

TESTED EQUIPMENT
IPV Methods

CALIBRATION NUMBER

EXPIRATION

TEST STANDARD USED
Mixed standard 1/10
Mixed standard 1/100

PART NUMBER
N069-1579
N930-0221

EXPIRATION DATE
May 30, 2023
November 30, 2023

CUSTOMER SUPPLIED
2 % HNO3
10 % HNO3

COMMENTS

CUSTOMER INITIALS



WO-02273746/2023

MAINTENANCE REPORT AND TEST CERTIFICATE OPTIMA 8000

SERIAL NUMBER : 078N1310024C

DATE TESTED : April 3, 2023

1. MECHANICAL CHECKS

- A. Inspect and clean all fans and filters. ☐ OK
- B. Inspect and replace as necessary, all torch components including the RF coil. ☐ OK
- C. Inspect all tubing for sign of clacking or leaking. ☐ OK
- D. Adjust water and gas pressure regulator settings. ☐ OK
- E. Inspect and leak check pneumatics drawers. ☐ OK
- F. Clean the exterior of the instrument. ☐ OK

2. OPTICAL CHECKS

- A. Inspect and clean all optical components. ☐ OK
- B. As required, check and replace all purgefilters. ☐ OK
- C. Recheck optical alignment. ☐ OK

3. COOLING SYSTEM CHECKS

- A. Perform preventive maintenance on chiller. ☐ OK
- B. Flush out the chiller every six months. ☐ OK

4. PERFORMANCE CHECKS

- A. Torch View Alignment. ☐ OK
- B. Wavelength Calibration. ☐ OK

MAINTENANCE REPORT AND TEST CERTIFICATE
OPTIMA 8000

SERIAL NUMBER : 078N1310024C		DATE TESTED : April 3, 2023	
PARAMETER	SPECIFICATION	FINAL VALUE	
Spectral Resolution : UV	As 193.696 nm	≤ 0.009	
	Ni 231.604 nm	≤ 0.011	
	Ni 341.476 nm	≤ 0.015	
	Ba 455.403 nm	≤ 0.020	
Spectral Resolution : VIS	Ba 455.403 nm	≤ 0.020	
	Zn 206.200 nm	% RSD < 1.0	
	Mg 280.271 nm	% RSD < 1.0	
	Mg 285.213 nm	% RSD < 1.0	
Precision	Ba 455.403 nm	% RSD < 1.0	
	As 193.696 nm	3(SD) ppb	
	Se 196.026 nm	3(SD) ppb	
	Ti 190.801 nm	3(SD) ppb	
Detection Limits : Axial	Pb 220.353 nm	3(SD) ppb	
	As 193.696 nm	3(SD) ppb	
	Zn 213.857 nm	3(SD) ppb	
	Mn 257.610 nm	3(SD) ppb	
Detection Limits : Radial	La 379.478 nm	3(SD) ppb	
	Ba 455.403 nm	3(SD) ppb	
	Ba 493.408 nm	3(SD) ppb	
	Mn 257.610 nm	3(SD) ppb	
BEC : Axial (IB X 1000)/(IS-IB)	Mn 257.610 nm	≤ 30 ppb	
BEC : Radial (IB X 1000)/(IS-IB)	Mn 257.610 nm	≤ 30 ppb	

MAINTENANCE REPORT AND TEST CERTIFICATE
OPTIMA 8000

SERIAL NUMBER : 078N1310024C	DATE TESTED : April 3, 2023
Remarks :	
Commissioning follow as commissioning performance sheets.	
This is to certify that the above tests have been performed and the configuration tested	
<input checked="" type="checkbox"/>	meets
<input type="checkbox"/>	does not meet
the PerkinElmer Specifications listed on this certificate.	
This certificate does not modify PerkinElmer's standard terms and condition of sale, including warranty terms.	
Service	d.
Authorized Representative :	Service Engineer

Align View XY Axial for analyte Mn 257.610

X-position Y-position Intensity

-2.0	15.0	2920926.2
-1.6	15.0	4117205.6
-1.2	15.0	5581541.7
-0.8	15.0	6990827.7
-0.4	15.0	8176328.5
0.0	15.0	9075098.4
0.4	15.0	8960265.5
0.8	15.0	9360445.5
1.2	15.0	7467099.0
1.6	15.0	6255831.1
2.0	15.0	5030833.2
0.0	10.0	159365.9
0.0	10.5	241214.9
0.0	11.0	446309.1
0.0	11.5	964275.3
0.0	12.0	1659518.8
0.0	12.5	2781326.3
0.0	13.0	4117574.4
0.0	13.5	5863526.6
0.0	14.0	7007618.7
0.0	14.5	8248882.5
0.0	15.0	8915353.6
0.0	15.5	8830206.3
0.0	16.0	8476274.2
0.0	16.5	7574239.7
0.0	17.0	5916533.5
0.0	17.5	4806692.1
0.0	18.0	3470213.6
0.0	18.5	2459999.5
0.0	19.0	1409798.3
0.0	19.5	836888.1
0.0	20.0	457127.2
-0.8	15.0	7399406.7
-0.4	15.0	8255530.6
0.0	15.0	8767341.7
0.4	15.0	8902714.8
0.8	15.0	8341631.7
1.2	15.0	4448485.6
1.6	13.5	5980471.5
2.0	14.0	7305087.4
0.4	14.5	9079824.9
0.4	15.0	9038053.5
0.4	15.5	8965644.2
0.4	16.0	8519954.3
0.4	16.5	7478375.8
0.4	17.0	5956440.9

3/4/2566 10:51:07 aligned for analyte Mn 257.610

X viewing position set to 0.4 mm having Peak intensity 9038053.5 for Axial viewing
Y viewing position set to 15.0 mm having Peak intensity 9038053.5 for Axial viewing

Align View X Radial for analyte Mn 257.610

X-position	Y-position	Intensity
-7.0	15.0	23032.5
-6.5	15.0	27006.7
-6.0	15.0	35560.5
-5.5	15.0	57821.4
-5.0	15.0	90335.9
-4.5	15.0	136105.4
-4.0	15.0	206645.2
-3.5	15.0	299882.1
-3.0	15.0	428877.1
-2.5	15.0	589771.2
-2.0	15.0	706184.3
-1.5	15.0	841150.2
-1.0	15.0	1019788.8
-0.5	15.0	1329407.6
0.0	15.0	1381151.1
0.5	15.0	1426400.1
1.0	15.0	1309824.4

1.5	15.0	1099234.2
2.0	15.0	784376.5
2.5	15.0	574061.3
3.0	15.0	437455.8
3.5	15.0	324105.7
4.0	15.0	264022.3
4.5	15.0	183005.6
5.0	15.0	117089.3
5.5	15.0	70743.1
6.0	15.0	40927.8
6.5	15.0	27379.1
7.0	15.0	20863.3

3/4/2566 10:54:00 aligned for analyte Mn 257.610

X viewing position set to 0.5 mm having Peak intensity 1426400.1 for Radial viewing

Method Loaded
 Method Name: DLRL-Cal
 IEC File:
 Method Description: C8000-Calibration for later test

Method Last Saved: 5/4/2565 10:59:28

MSF File:

Sequence No.: 1
 Sample ID: Calib Blank 1
 Logged In Analyst (Original) : TET
 Initial Sample Wt:
 Dilution:
 Wash Time:

Autosampler Location:
 Date Collected: 3/4/2566 11:18:12
 Data Type: Reprocessed on 3/4/2566 11:32:52
 Initial Sample Vol:
 Sample Prep Vol:

Nebulizer Parameters: Calib Blank 1
 Analyte Back Pressure Flow
 All 197.0 kPa 0.50 L/min

Mean Data: Calib Blank 1			
Analyte	Mean Corrected Intensity	Std.Dev.	RSD
As 193.696	96.5		
Zn 213.857	584.3		
Mn 257.610	1401.8		
La 379.478	352.7		
Ba 455.403	25802.4		
Ba 493.408	45750.3		

Sequence No.: 2
 Sample ID: Calib Std 1
 Logged In Analyst (Original) : TET
 Initial Sample Wt:
 Dilution:
 Wash Time:

Autosampler Location:
 Date Collected: 3/4/2566 10:55:27
 Data Type: Reprocessed on 3/4/2566 11:32:52

Initial Sample Vol:
 Sample Prep Vol:

Nebulizer Parameters: Calib Std 1
 Analyte Back Pressure Flow
 All 194.0 kPa 0.50 L/min

Mean Data: Calib Std 1			
Analyte	Mean Corrected Intensity	Std.Dev.	RSD
As 193.696	13635.5		
Zn 213.857	149844.9		
Mn 257.610	1615840.4		
La 379.478	340770.3		
Ba 455.403	839940.7		
Ba 493.408	633243.6		

Calibration Summary					
Analyte	Stds.	Equation	Intercept	Slope	Curvature
As 193.696	1	Lin, Calc Int	0.0	2731	0.00000
Zn 213.857	1	Lin, Calc Int	0.0	149800	0.00000
Mn 257.610	1	Lin, Calc Int	0.0	1616000	0.00000
La 379.478	1	Lin, Calc Int	0.0	340800	0.00000
Ba 455.403	1	Lin, Calc Int	0.0	8399000	0.00000
Ba 493.408	1	Lin, Calc Int	0.0	6332000	0.00000

Sequence No.: 3
 Sample ID: IDL-RL (2% HNO3)
 Logged In Analyst (Original) : TET
 Initial Sample Wt:

Autosampler Location:
 Date Collected: 3/4/2566 11:19:52
 Data Type: Reprocessed on 3/4/2566 11:32:52

Initial Sample Vol:

Dilution: 3X
 Wash Time:
 Sample Prep Vol:

Nebulizer Parameters: IDL-RL (2% HNO3)
 Analyte Back Pressure Flow
 All 198.0 kPa 0.50 L/min

Mean Data: IDL-RL (2% HNO3)					
Analyte	Mean Corrected Intensity	Conc. Units	Std.Dev.	Sample Conc. Units	Std.Dev. RSD
As 193.696	-32.0	-0.0 mg/L	0.00	-35.2 pg/L	2.60 7.40%
Zn 213.857	37.4	0.0 mg/L	0.00	0.7 pg/L	0.26 35.07%
Mn 257.610	475.9	0.0 mg/L	0.00	0.9 pg/L	1.49 168.85%
La 379.478	-36.3	-0.0 mg/L	0.00	-0.3 pg/L	1.12 350.55%
Ba 455.403	26579.4	0.0 mg/L	0.00	9.5 pg/L	2.86 30.09%
Ba 493.408	-20698.9	-0.0 mg/L	0.00	-9.8 pg/L	9.64 98.34%

Reprocessing Begun
Logged In Analyst: TET
Technique: ICP ContinuousResults Data Set (original): PM3APR23
Results Library (original): C:\Users\Public\PerkinElmer\IPV\Results.mdb
Results Data Set (reprocessed):
Results Library (reprocessed):Sequence No.: 1
Sample ID: Calib Blank 1
Autosampler Location:
Date Collected: 3/4/2566 11:23:46
Data Type: Reprocessed on 3/4/2566 11:32:04
Logged In Analyst (Original) : TET
Initial Sample Vol:
Dilution:
Initial Sample Vol:
Sample Prep Vol:

Wash Time:

Nebulizer Parameters: Calib Blank 1
Analyte Back Pressure Flow
All 198.0 kPa 0.50 L/minMean Data: Calib Blank 1
Analyte Mean Corrected Conc. Units Calib
Tl 190.801 Intensity Std.Dev. RSD [0.00] µg/L
As 193.696 -113.3 [0.00] µg/L
Se 196.026 285.4 [0.00] µg/L
Pb 220.353 1176.2 [0.00] µg/LSequence No.: 2
Sample ID: DL-Standard
Autosampler Location:
Date Collected: 3/4/2566 11:29:24
Data Type: Reprocessed on 3/4/2566 11:32:04
Logged In Analyst (Original) : TET
Initial Sample Vol:
Dilution:
Initial Sample Vol:
Sample Prep Vol:
Wash Time:Nebulizer Parameters: DL-Standard
Analyte Back Pressure Flow
All 199.0 kPa 0.50 L/minMean Data: DL-Standard
Analyte Mean Corrected Conc. Units Calib
Tl 190.801 Intensity Std.Dev. RSD [1000] µg/L
As 193.696 19454.6 [1000] µg/L
Se 196.026 17563.5 [1000] µg/L
Pb 220.353 4574.6 [500] µg/L
31327.5 [500] µg/L

Calibration Summary

Analyte	Stds.	Equation	Intercept	Slope	Curvature	Corr. Coef.	Reslope
Tl 190.801	1	Lin, Calc Int	0.0	19.45	0.00000	1.000000	
As 193.696	1	Lin, Calc Int	-0.0	17.56	0.00000	1.000000	
Se 196.026	1	Lin, Calc Int	0.0	9.149	0.00000	1.000000	
Pb 220.353	1	Lin, Calc Int	0.0	62.65	0.00000	1.000000	

Sequence No.: 3
Sample ID: IDL-XL (2% HNO3)
Autosampler Location:
Date Collected: 3/4/2566 11:25:37
Data Type: Reprocessed on 3/4/2566 11:32:04
Logged In Analyst (Original) : TET
Initial Sample Vol:
Dilution: 3X
Initial Sample Vol:
Sample Prep Vol:
Wash Time:

Nebulizer Parameters: IDL-XL (2% HNO3)

Analyte Back Pressure Flow
All 198.0 kPa 0.50 L/min

Mean Data: IDL-XL (2% HNO3)

Analyte	Mean Corrected Intensity	Conc. Units	Calib. Conc. Units	Std.Dev.	Sample Units	RSD
Tl 190.801	35.1	2 µg/L	2 µg/L	1.24	5 µg/L	3.73 68.95%
As 193.696	-14.0	-1 µg/L	-1 µg/L	1.42	-2 µg/L	4.26 177.97%
Se 196.026	-6.5	-1 µg/L	-1 µg/L	0.96	-2 µg/L	2.87 134.85%
Pb 220.353	-135.0	-2 µg/L	-2 µg/L	3.83	-6 µg/L	11.48 177.50%

Method: Resolution
Result: PM3APR23

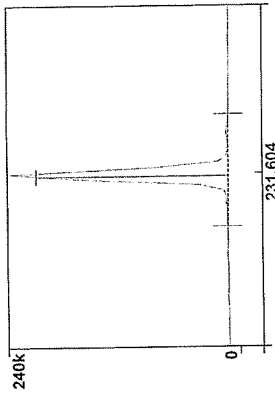
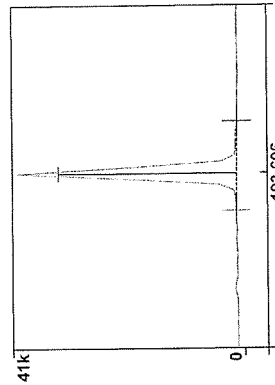
Spectra

Sample ID: Res (N069-1579/10)

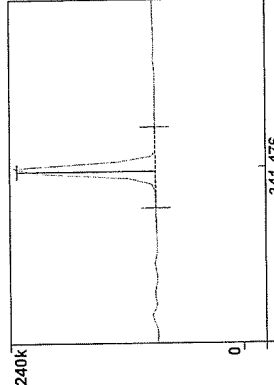
Rep: 3

Rep: 3

As 193.696-Res



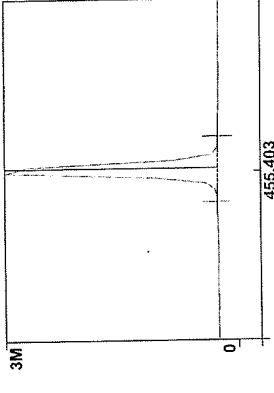
Ni 341.476-Res



Rep: 3

Rep: 3

Ba 455.403-Res



Method: Precision

Page 1

Date: 3/4/2566 11:12:20

Method Loaded
TEC File: Precision

Method Description: C8000 -N=10- 1.0% RSD

Method Last Saved: 3/5/2554 12:31:51
MSF File:

Sequence No.: 4

Sample ID: RSD STD (N069-1579/10)

Analyst:

Initial Sample Wt:

Dilution:

Wash Time:

Autosampler Location:
Date Collected: 3/4/2566 11:02:43
Data Type: Original
Initial Sample Vol:
Sample Prep Vol:

Neblulizer Parameters: RSD STD (N069-1579/10)
All Back Pressure Flow 195.0 kPa 0.50 L/min

Mean Data: RSD STD (N069-1579/10)

Analyte Mean Corrected

Zn 206.200 Intensity 493474.3

Mg 280.271 3275340.1

Mg 285.213 196113.7

Ba 455.403 7794526.3

Calib. Conc. Units

Std. Dev. Conc. Units

Sample Conc. Units

Std. Dev. Conc. Units

RSD Conc. Units

Method Loaded

TEC File: Precision

Method Description: C8000 -N=10- 1.0% RSD

Method Last Saved: 3/4/2566 11:07:51
MSF File:

Sequence No.: 5

Sample ID: RSD STD (N069-1579/10)

Analyst:

Initial Sample Wt:

Dilution:

Wash Time:

Autosampler Location:
Date Collected: 3/4/2566 11:08:51
Data Type: Original
Initial Sample Vol:
Sample Prep Vol:

Neblulizer Parameters: RSD STD (N069-1579/10)
All Back Pressure Flow 196.0 kPa 0.50 L/min

Mean Data: RSD STD (N069-1579/10)

Analyte Mean Corrected

Zn 206.200 Intensity 515663.2

Mg 280.271 3404809.8

Mg 285.213 197460.0

Ba 455.403 8071203.3

Calib. Conc. Units

Std. Dev. Conc. Units

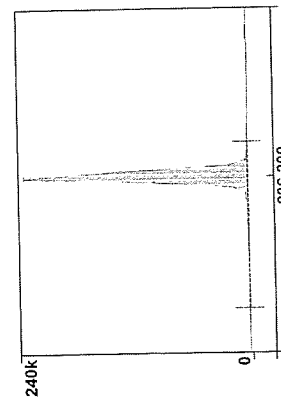
Sample Conc. Units

Std. Dev. Conc. Units

RSD Conc. Units

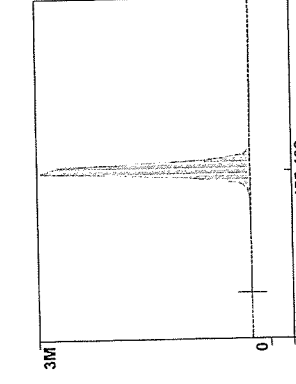
Rep: 5

240k



Rep: 5

280.271



Rep: 1

455.403



PerkinElmer TruQ

Atomic Spectroscopy Standard

Certificate of Analysis

PerkinElmer Number: N0691579
Description: Multi-Element Standard
Matrix: 2% HNO₃
Lot Number: 57-024CRX1

Certification Date: NOV -- 2021
Expiration Date: MAY 30 2023

* Instrumental Analysis using ICP Spectrometer:

Analyte	Labeled	Measured	SRM
As	50.0 µg/mL	50.1 µg/mL	3103a*
K	50.0 µg/mL	50.3 µg/mL	3141a*
La	10.0 µg/mL	10.0 µg/mL	3127a*
Li	10.0 µg/mL	10.0 µg/mL	3128a*
Mn	10.0 µg/mL	10.1 µg/mL	3132*
Ni	10.0 µg/mL	10.0 µg/mL	3136*
Sr	10.0 µg/mL	10.0 µg/mL	3153a*
Zn	10.0 µg/mL	10.0 µg/mL	3168a*
Ba	1.00 µg/mL	1.01 µg/mL	3104a*
Mg	1.00 µg/mL	1.01 µg/mL	3131a*

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

Reference Multi: Lot# 2-84MJ, 3-168MJ, 4-39MJ

Refer to side 2 for details of certification.

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

Certify



PerkinElmer

PerkinElmer, Inc.

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

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

Visit www.perkinelmer.com/isooffice for a complete listing of our global offices.

PerkinElmer TruQ

Atomic Spectroscopy Standard

Certificate of Analysis

PerkinElmer Number: N9300221
Description: Instrument Calibration Standard 4
Matrix: 5% HNO₃
Lot Number: 58-169CRY1

Certification Date: MAY -- 2022
Expiration Date: NOV 30 2023

* Instrumental Analysis using ICP Spectrometer:

Analyte	Labeled	Measured	SRM	Analyte	Labeled	Measured	SRM
As	100 µg/mL	99.8 µg/mL	3103a*	Pb	50.0 µg/mL	49.9 µg/mL	3128*
Tl	100 µg/mL	99.4 µg/mL	3158*	Se	50.0 µg/mL	49.8 µg/mL	3149*
Cd	50.0 µg/mL	50.0 µg/mL	3108*				

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

Reference Multi: Lot# 57-156CR, 1-177YJ, 54-134CR

Refer to side 2 for details of certification.

Balances are calibrated with weight sets traceable to NIST.
We guarantee that our PerkinElmer TruQ Atomic Spectroscopy Standards are stable and accurate to ±0.5% of certified concentration until the expiration date, provided the standards are kept tightly capped and stored under normal laboratory conditions. This value is the sum of cumulative errors associated with the analytical determinations, pipetting, and diluting to final volume. For these solutions we use high purity reagents (deionized), and leached, triple-rinsed bottles. All glassware used is class A.



PerkinElmer Inc.
U.S.A. Tel: 1-203-925-4800
U.S.A. Toll Free: 1-800-762-4100

Visit www.perkinelmer.com/iso/certificates for a complete listing of our global offices.



PerkinElmer

Global Service Training Department
Service Engineer Certification

Wiphan Promlunda

This is to certify that the above mentioned
PerkinElmer representative has been trained to
service the instrument indicated below:

ICP220B Optima S300 & Optima 4X/5X/7X00 Series

Instructor

Date: July 20, 2012

Certifier
(Manager)



MAINTENANCE REPORT

ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAAnalyst 600

Customer : THAI ENVIRONMENTAL
 Address : TECHNICAL LIMITED
 1/6 Soi Ramkhamheang 145,
 Khwaeng/Khet Saphan Sung,
 Bangkok 10240
 User Name: คุณ นวกรธร เต็มประจักษ์โพธิ์
 Phone: 02-7353101-3, 02-3737799
 E-mail: ketsarin.c@tet1995.com
 admin@tet1995.com

Date Tested: 20-11-66
 Recommendation Recertification
 Period 6 Months
 Recertification Due: 20-11-66
 Date Last Certified: 22-11-65
 Visit Number: 1 OF 2
 TH One Source Phone: 081-7316733
 E-mail: thonesource@gmail.com

CONFIGURATION TESTED

MODEL ANALYST 600
 AS 800
 FIAS-100

SERIAL NUMBER 600S5070101
 801S5070102
 2288

SOFTWARE AA WinLab Version 3.2

TEST STANDARD USED
 GFAAS Mixed standard

PART NUMBER
 N9300244



MAINTENANCE REPORT

ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAAnalyst 600

SERIAL NUMBER 600S5070101 DATE TESTED 20-11-66

1. INSTRUMENT CHECKS
 A. The Mirror and Lenses Condition ☐ OK
 B. Grating Condition ☐ OK
 C. Replace or Clean Dust Filter ☐ OK
 D. Cleaning the Contact Cylinders ☐ OK
 E. Cleaning the Furnace Windows ☐ OK

2. AUTOSAMPLE CHECK
 A. Sampling and Aim ☐ OK
 B. Sampling & Rinse Pump ☐ OK
 C. Sample Position & Clean ☐ OK
 D. Clean or Replace the Hall Sensor ☐ OK

3. COOLING SYSTEM CHECKS
 A. Clean and Change Distill water ☐ OK
 B. Thermosensor ☐ OK

4. FIAS CHECKS
 A. Pump and 5 Port Valve ☐ OK
 B. Chemifold and Tubing ☐ OK
 C. Power Supply ☐ OK
 D. Flow meter and Gas system ☐ OK



MAINTENANCE REPORT

ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAAnalyst 600

SERIAL NUMBER	600S5070101	DATE TESTED	20-11-66
PARAMETER	SPECIFICATION		
B. THGA Tests			
1. Furnace Gas Flows			
Internal Flow	250 ± 25 mL/min	235	mL/min
External Flow	100 ± 10 mL/min	110	mL/min
2. Chromium Baseline Noise			
(measure 5 furnace dry firings without any sample)			
Baseline	≤ 0.005 Int.Abs	0.0002	Int.Abs
SD	≤ 0.005 Int.Abs	0.0002	Int.Abs
3. Chromium Characteristic Mass(m ₀) and Precision			
(measure 5 furnace firing using 20 ul sample injections of 10 ug/L Or standard)			
m ₀ Results	6.5 pg ± 1.5 pg	5.7	pg
Precision	≤ 2.0%	1.41	%
4. Copper Characteristic Mass(m ₀) and Zeeman Ratio			
(measure 5 furnace firing using 20 ul sample injections of 25 ug/L Cu standard)			
m ₀ Results	17.0 pg ± 3.5 pg	14.2	pg
Zeeman Ratio	0.58 ± 0.04	0.560	



MAINTENANCE REPORT

ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAAnalyst 600

SERIAL NUMBER	600S5070101	DATE TESTED	20-11-66
Remarks :	Changed The Controller Bd. Atomizer (4 May 2015)		
Replace The Contact Cylinder (27 July 2021)			
Zeeman Ratio	=	Atomic Signal(peak area)	
	=	Atomic Signal(peak area)+Background Signal(peak area)	
	=		
	=	Changed the THGA Contact Cylinder on 22 July 2022	
		Copper blank = 0.0015	
This is to certify that the above tests have been performed and the configuration tested			
<input checked="" type="checkbox"/> meets			
<input type="checkbox"/> does not meet			
the PerkinElmer Specifications listed on this certificate.			
This certificate does not modify PerkinElmer's standard terms and condition of sale, including warranty terms.			
Service Department TH ONE SOURCE CO., LTD.			
([REDACTED])			



Certificate of Training

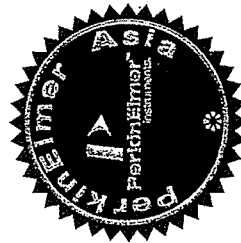
This is to certify that

Krungchai Treevichien

has successfully completed

Analyst 600/700/800 Service Training

09 to 13 February 2004



13 Feb 2004



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



Cert. No.: 23TM604
Page : 1 of 3

Certificate of Calibration

Equipment : Incubator
Manufacturer : Memmert
Model : INE 500
Serial No. : E505.0595
ID No. : TET.LAB.INC 01
Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240
Location : Laboratory (Thai Environmental Technic Limited)
Received Order : 10 April 2023
Calibration Date : 10 April 2023
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Man Pattanapongpaiboon

Approved by :

() Pornthippa Tameyakh
() Malee Butkruea
() Suwit Imjai

Issue Date : 25 April 2023

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.

A 0053457



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2304-0146OC-4
Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).
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 MY41021843 22LM172 27 Dec 2023

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

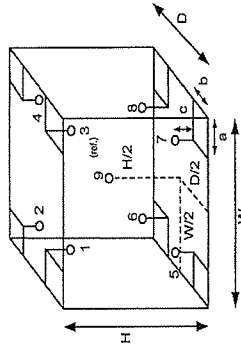
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	25	25
REL.Humid. (%)	54	57
AC Supply (Volt)	223	219



Probe Installation Details :		Dimension of Chamber :	
a =	5.0 cm	D =	0.40 m
b =	5.0 cm	W =	0.56 m
c =	5.0 cm	H =	0.48 m
		Capacity =	0.11 m ³

Wudu

a 1158197



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2304-0146OC-4
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
35.0	35.0	35.0	0.065	0.32	0.67	2
41.5	41.5	41.5	0.032	0.49	0.63	2
44.5	44.5	44.5	0.086	0.60	0.86	2

Calibration Point (°C)		Measured Temperature (°C)								Uncertainty (± °C)
		Position								
		1	2	3	4	5	6	7	8	9 (ref.)
35.0	35.0	34.870	34.847	34.722	34.860	34.744	35.047	34.842	35.288	35.026
41.5	41.5	41.625	41.612	41.461	41.733	41.300	41.428	41.418	41.874	41.758
44.5	44.5	44.744	44.708	44.553	44.862	44.205	44.476	44.352	44.931	44.778

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 %.

-o0o-

Wudu

a 1158196



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
53/44 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10259
TEL. 0-2717-3000-29 FAX. 0-2719-9484



METROLOGY INSTITUTE OF THAILAND
CALIBRATION 0008

Cert. No.: 23TM605
Page: 1 of 3

Certificate of Calibration

Equipment : Incubator
Manufacturer : Memmert
Model : INE 500
Serial No. : ES05.1143
ID No. : TET.LAB.ING 02

Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240

Location : Laboratory (Thai Environmental Technic Limited)

Received Order : 10 April 2023
Calibration Date : 10 April 2023
Ambient Temperature : $(26 \pm 10) ^\circ\text{C}$
Relative Humidity : $(50 \pm 30) \%$

Calibrated by : Man Pattanapongpaiboon

Approved by :

() Pornhippa Tameyakul
(☒) Malee Bulkreea
() Suwit Injai

Issue Date : 25 April 2023

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.

A 0053458



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2304-01460C-5
Procedure Used :-

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

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 : MY41021843 : 22LM172 : 27 Dec 2023

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

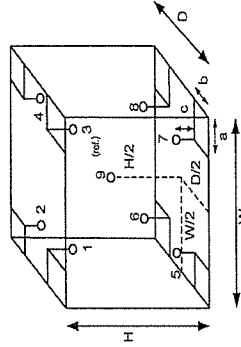
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration	
Beginning	Finished
Temp. (°C)	25
REL.Humid. (%)	54
AC Supply (Volt)	223
	219



Probe Installation Details :

a = 5.0 cm
b = 5.0 cm
c = 5.0 cm
Dimension of Chamber :
D = 0.40 m
W = 0.56 m
H = 0.48 m
Capacity = 0.11 m³

Position :	Ref. Std. ID No.:
1	21-04RTD-11
2	21-04RTD-12
3	21-04RTD-13
4	21-04RTD-14
5	21-04RTD-15
6	21-04RTD-16
7	21-04RTD-17
8	21-04RTD-18
9 (ref.)	21-04RTD-19

Malee

a 1158195



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2304-01460C-5
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 23TM605
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
35.0	35.0	35.0	0.021	0.69	0.70	2
37.0	37.0	37.0	0.077	0.61	0.73	2
44.5	44.5	44.5	0.049	0.94	0.99	2

Calibration Point (°C)	Measured Temperature (°C)								Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)
35.0	34.998	34.938	34.900	34.866	35.143	35.446	35.083	35.362	34.765
37.0	36.978	36.975	36.972	36.971	37.390	37.559	37.324	37.437	37.010
44.5	44.631	44.502	44.429	44.412	44.752	45.106	44.600	45.021	44.183

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 %.

-o0o-

Agilent CrossLab Start Up Services Agilent 7890 Gas Chromatograph Preventive Maintenance Checklist

Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results.

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak. This checklist will be completed at the end of the service and provided to you as a record of the preventive maintenance activities.

Introduction

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures.
- Any parts, not included in the Parts Lists section of this document, are not part of the recommended Preventive Maintenance service, nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.

Important Customer Web Links

- For more information about **Agilent Technologies services**, please visit our website using the following URL: <http://www.agilent.com/en-us/products/crosslab-instrument-services/service-repair>
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>.
- To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- A useful **Agilent Resource Center** web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: <https://www.agilent.com/en-us/agilentresources>.
- Need technical support, FAQs, supplies? – visit our **Support Home page** <http://www.agilent.com/search/support>.
- Videos about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube channel** at <https://www.youtube.com/user/agilent>.
- **7890B Manuals** are also available on Agilent.com:
 - **Safety** https://www.agilent.com/cs/library/usermanuals/public/7890B_Safety.pdf
 - **Installation and First Startup** https://www.agilent.com/cs/library/usermanuals/Public/7890B_Installation.pdf
 - **Operation Manual** https://www.agilent.com/cs/library/usermanuals/Public/7890B_Operation.pdf
 - **Maintaining Your GC** https://www.agilent.com/cs/library/usermanuals/public/G3430-90052%207890B_Maintaining%20Guide.pdf

Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check "Section not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance service in the order of the tasks listed.
- Complete the Service Review section together with the customer.
- Complete the fields for page numbers at the foot of each selected page
- Complete the total number of pages field in the Service Completion section
- **Ask the customer to sign the Service Completion section including the customer's and your signature.**

Additional Instruction Notes

- Check for any active service notes for this unit. If there are any applicable "Safety" or "Modification Recommended" Service notes, plan to implement the changes on this unit before doing any qualification service.
- Do not implement firmware updates, unless you get approval from the customer and are sure that they are compatible with the instrument control software.

System Information

- ☒ Check this box if an instrument configuration report is attached instead of completing the table below.

Instrument System Name and ID	GC7890 B	CN16243040
Instrument System Site and Location	TET	Laboratory

List System Component Product Numbers		List the Serial Numbers of each Component
1.	G3440P	CN16343040
2.	G4913A	CN16350092
3.	G4914A	CN16400014
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components, settings as defined by current Service Notes.
- ☒ Check for required firmware updates and verify with customers if they would like them installed.
- ☒ Before starting the following procedures, record the Detector Signal Output(s) in the results table. If the GC is turned OFF or in a service mode, comparing the detector outputs before and after the service is not possible.

Preventive Maintenance Procedure

Clean and inspect GC

- ☒ Unplug power cord from the power source.
- ☒ Open GC covers and vacuum/remove any dust/debris. Pay particular attention to cooling fans.
- ☒ Inspect internal connectors for proper contact and placement.
- ☒ Reconnect Power to the GC. Power the GC on and verify the power on self-test passed.
- ☒ Verify oven motor spins freely and turns on with the oven door closed; off when the door is opened.
- ☒ Verify operation of all other fans - the inlet and EPC cooling fans.
- ☒ Verify oven intake/outlet flap assembly is operating smoothly while heating and cooling the oven

Inlet and detector consumable replacement

- ☒ For the inlets installed, perform inlet maintenance as defined in the 7890 manual - "Maintaining Your GC" - for the Inlet(s) installed.
- ☒ Replace the split vent trap cartridge filter on units with these inlets: Split/Splitless Capillary (SSL), Multi-Mode Inlet (MMI), Programmed Temperature Vaporizer (PTV), Volatiles Interface (VI).
- ☒ If the inlet system is used in Split Mode with viscous samples, inspect and clean the split vent tube on the inlet and flush or replace the tubing between the inlet and the split vent trap.
- ☒ If the GC includes a Flame Ionization Detector (FID), replace the jet. If the ignitor shows any buildup of sample or corrosion, replace the ignitor. Examine the HD collector and castle assemblies for contamination - clean as necessary.

Zero Sensors and Leak test

- ☒ Zero all pressure sensors per the procedure in the 7890 "Advanced User Guide".
- ☒ Perform inlet pressure decay test(s) as defined in the 7890 "Troubleshooting Manual". If the PM is done in preparation for an Operational Qualification, then the pressure decay test defined within that protocol can be used for the PM.
- ☒ Record if test passed or failed in the results table.

ALS Maintenance

- ☐ Section NOT applicable
- ☒ Check all cabling and configuration settings between GC, tray, and injectors.
- ☒ Vacuum or remove any dust, especially around fans.
- ☒ Check operation of all fans.
- ☒ Check syringe for smooth plunger operation.
- ☒ Check for smooth operation of the needle support – clean if necessary

Restore Instrument

- ☒ Restore the normal operating conditions or customer method using the Data System.
- ☒ Purge the system with carrier flow for 15 minutes
- ☒ Bake out the system, then restore the normal operating conditions
- ☒ After equilibration, check and record the post PM detector signal output values. Results should be similar or lower than the detector outputs recorded prior to PM.
- ☒ Perform a chemical checkout. If this is a routine PM, inject the customer's sample using the ALS if applicable. This will act as a final checkout of both the ALS and the GC.

Note: If the PM Service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Signature Page

Service Review

- ☐ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review with the customer this service, parts replaced, and test results obtained.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box or if necessary, in the customer's IQ records.
- ☒ Supply the customer with a copy of the Smart Alerts flyer.
- ☐ Describe Smart Alerts to the customer.
- ☐ Install Smart Alerts if requested.

7890 GC Test Results Table

Detector Signal Outputs	Before PM Service	After PM Service
Front detector output	N/A	24.7
Back detector output	N/A	-922.3 (high)
AUX detector output	N/A	SP/A 172.6
Pressure decay test	Expected test result	Actual test result
Front inlet pressure decay test	Pass	Pass
Back inlet pressure decay test	Pass	Pass

7890 Parts List Table

The following kits are recommended for capillary and purged packed inlets. If this is a general PM and the customer has a preferred set of consumables, you may use the customer's consumables.

Part description	Part number	Product or model# where used	Quantity consumed
SSL Capillary Inlet PM kit Splitless	5185-6497	7890A/B	1
SSL Capillary Inlet PM kit split	5188-6496	7890A/B	1
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	N/A
Split Liner - with Glass Wool	5190-2295	7890A/B	N/A
PP Inlet PM kit	5188-6498	7890A/B	N/A
Split vent trap PM kit, single cartridge (for MMI, PTV & V)	5188-6495	7890A/B	N/A
MMI Cleaning Kit	G3510-60820	7890A/B	N/A
PTV Septumless Head Rebuild Kit	5182-9747	7890A/B	N/A
PTV Septumless Head Teflon Guide	5182-9748	7890A/B	N/A
Ignitor (glow plug) assembly with O-ring	19231-60680	7890A/B	1
FID Collector Rebuild/Cleaning Kit	G1531-67000	7890A/B	N/A
Standard .011-inch FID Jet for capillary FID base	G1531-80560	7890A/B	N/A
High Temperature .018-inch FID Jet for capillary FID base	G1531-80620	7890A/B	N/A
Standard .018 inch FID Jet for packed column with packed FID base	18710-20119	7890A/B	N/A
Standard .011-inch FID Jet for capillary column with packed/adaptable FID base	19244-80560	7890A/B	N/A
High Temperature .018-inch FID Jet for capillary column with packed/adaptable FID base	19244-80620	7890A/B	N/A
NP-U Jet, universal fit, .011-inch ID	G1534-80580	7890A/B	N/A
NPD Jet, universal fit, .011-inch ID Extended tip	G1534-80590	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	N/A
**FID Collector Replacement Kit, if needed	G1531-67001	7890A/B	N/A

Service Engineer Comments

If there are any specific points you wish to note as part of performing the service or other items of interest for the customer, please write include them in this box.

*Need to condition JFID. for high baseline.
and injection Hexane..*

Service Completion

Service request number: **44166.759722222** Service completed: **26 Sep 2022**

Agilent signature: or signature

Total number of parts: **1**