

ภาคผนวกที่ 4

ใบรับรองการสอบเทียบเครื่องมือ



บริษัท เอ็ม อี ที จำกัด MET Company Limited
36/659 หมู่ 6 ต.บางรักพัฒนา อ.บางบัวทอง จ. นนทบุรี 11110
36/659 Moo 6 Tambol Bangrakpattana Amphur Bangbuatong Nontaburi 11110
Tel : 0 2920 1458-9 Fax : 0 2920 1460 E-mail : met_jj@yahoo.com

TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

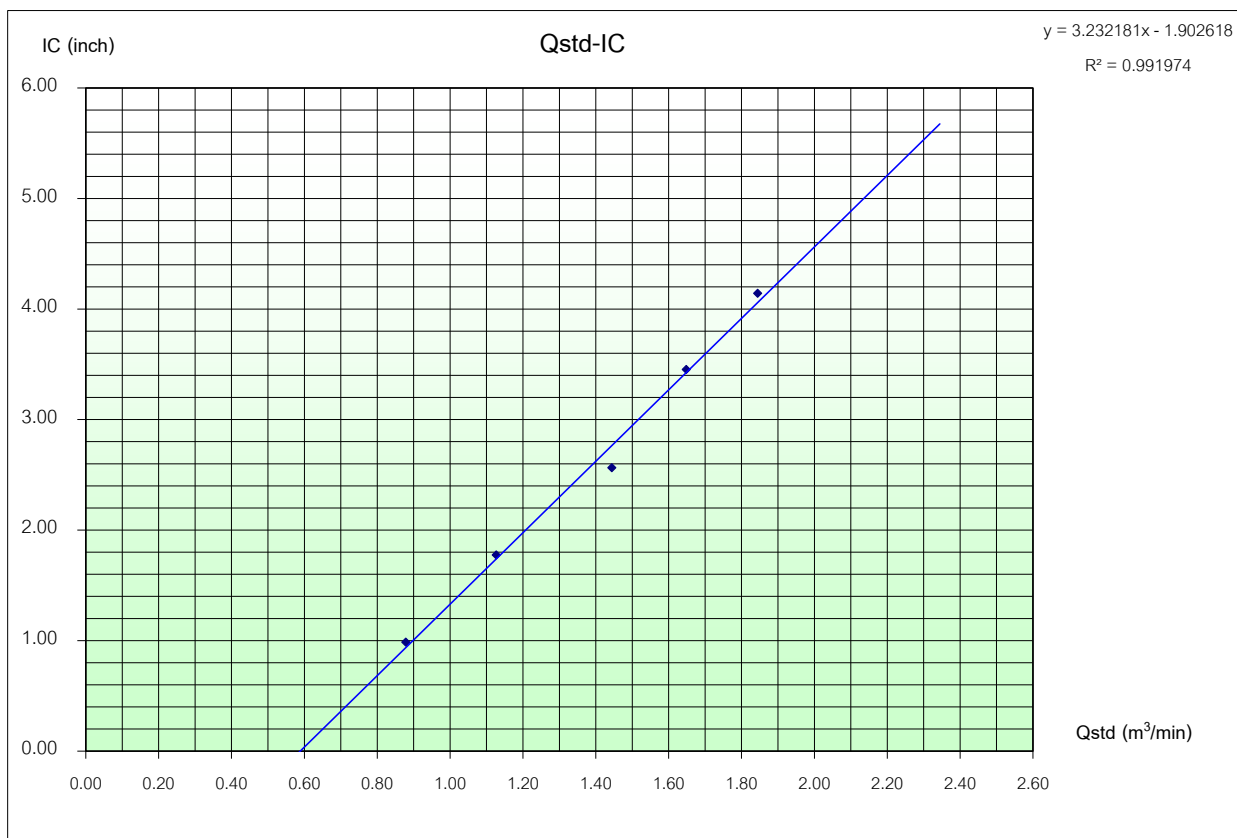
Sampler Location				Date	January 13, 2024
Project Site				Start Time	9:05 AM
Sampler Number	TSP No.2	Transfer Standard Type	Orifice	Stop Time	9:10 AM
Motor Serial Number	BL-02	Calibrator Model	TE-5025A	Person	
Recorder Serial Number	-	Calibrator Serial Number	1		

Plate No.	(Delta H)			(A)	(X)	(I)	(Y)	Temperature	Barometric Pressure	Start Meter	Stop Meter
	Pressure Drop Across Orifice (inH ₂ O)			$[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	$Q_{std} = (1/m)[(A-b)]$ (m ³ /min)	Sample Flow Rate Indicator (inch)	$IC = [[(Pa/P_{std})(T_{std}/Ta)]^{1/2}]$	("K = °C+273)	(mmHg)		
	Positive	Negative	ΔH_2O								
5	1.5	1.5	3.0	1.70868	0.87849	1.0	0.99	305.0	757.0		
7	2.4	2.5	4.9	2.18372	1.12676	1.8	1.78	305.0	757.0		
10	4.0	4.0	8.0	2.79026	1.44374	2.6	2.56	305.0	757.0		
13	5.2	5.2	10.4	3.18138	1.64815	3.5	3.45	305.0	757.0		
18	6.5	6.5	13.0	3.55689	1.84440	4.2	4.14	305.0	757.0		

Linear Regression Y ON X : Y= mX + b							Average	305.0	757.0		
1	Slope (m)	1.91345	Linear Equation				r^2	0.971641	Pstd(mmHg)	760.0	
2	Intercept (b)	0.02773	Set Point Flow Rate (X) (m ³ /min)			1.133	r	0.9857185	T _{NTP}	298.0	
3	Correlation Coefficient (r)	0.99995	Final Set Flow Rate = (I)			0		(Pa/Pstd)*(Tstd/Ta)		0.973192407	
Result								C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.986505148	

COMMENT

Andersen Instruments, Inc.



Calibrated By

Field Environmental

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Division Manager



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PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Sampler Location				Date	January 13, 2024
Project Site				Start Time	1:20 PM
Sampler Number	PM-10 No.2	Transfer Standard Type	Orifice	Stop Time	1:25 PM
Motor Serial Number	HVL-02	Calibrator Model	TE-5025A	Person	
Recorder Serial Number	-	Calibrator Serial Number	1		

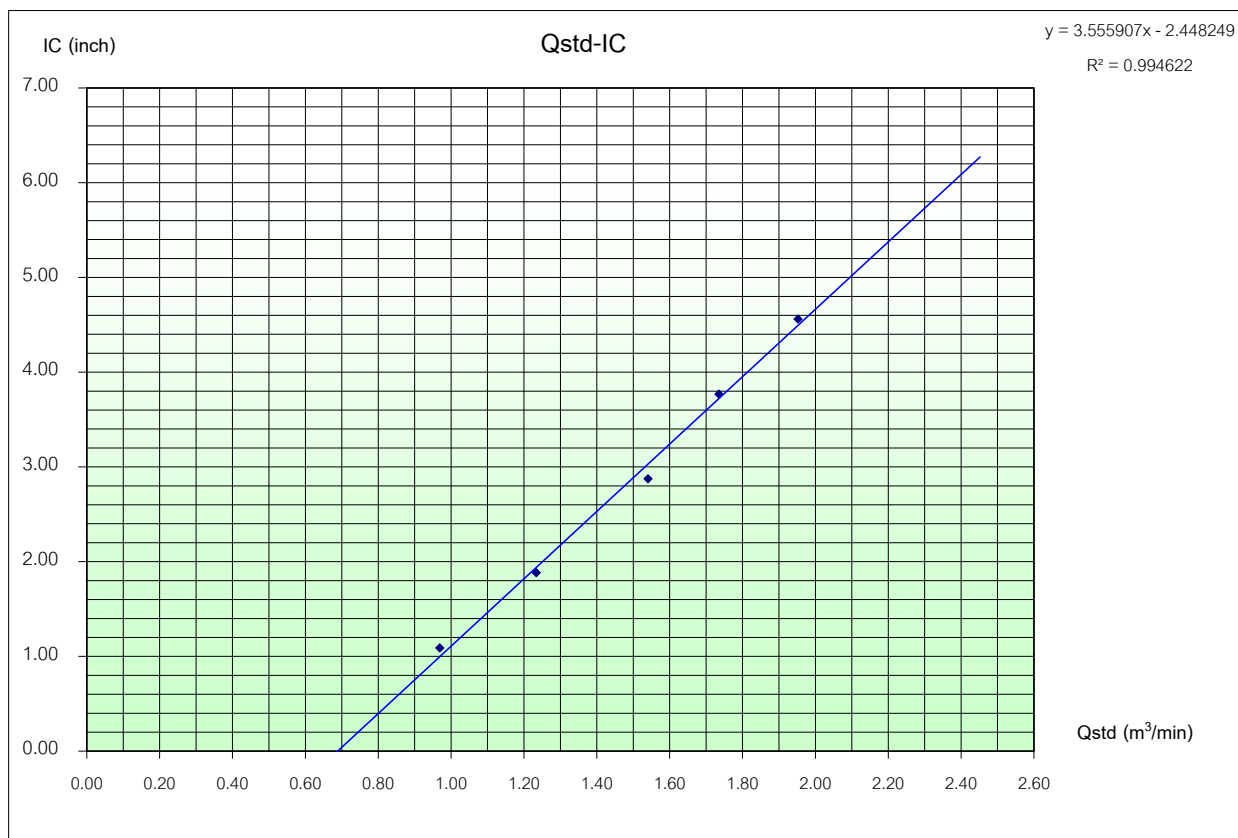
Plate No.	(Delta H)			(A)	(X)	(I)	(Y)	Temperature	Barometric Pressure	Start Meter	Stop Meter
	Pressure Drop Across Orifice (inH ₂ O)			$[\Delta H_{2O}(Pa/P_{std})(T_{std}/T_a)]^{1/2}$	$Q_{std} = (1/m)[(A-b)]$ (m ³ /min)	Sample Flow Rate Indication (inch)	$IC = [[(Pa/P_{std})(T_{std}/T_a)]^{1/2}]$	("K = °C+273)	(mmHg)		
	Positive	Negative	ΔH_{2O}								
5	1.8	1.8	3.6	1.88165	0.96889	1.1	1.09	303.0	760.0		
7	2.9	2.9	5.8	2.38837	1.23371	1.9	1.88	303.0	760.0		
10	4.5	4.5	9.0	2.97514	1.54037	2.9	2.88	303.0	760.0		
13	5.7	5.7	11.4	3.34841	1.73544	3.8	3.77	303.0	760.0		
18	7.2	7.2	14.4	3.76329	1.95227	4.6	4.56	303.0	760.0		

Linear Regression Y ON X : Y= mX + b

1	Slope (m)	1.91345	Linear Equation		Average	303.0	760.0		
2	Intercept (b)	0.02773	Set Point Flow Rate (X) (m ³ /min)	1.133	r ²	0.950727	Pstd(mmHg)	760.0	
3	Correlation Coefficient (r)	0.99995	Final Set Flow Rate = (I)	0	r	0.9750523	T _{NTP}	298.0	
Result				C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.98349835		0.991714853	

COMMENT

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TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Sampler Location				Date	January 13, 2024
Project Site				Start Time	9:00 AM
Sampler Number	TSP No.1	Transfer Standard Type	Orifice	Stop Time	9:05 AM
Motor Serial Number	BL-01	Calibrator Model	TE-5025A	Person	
Recorder Serial Number	-	Calibrator Serial Number	1		

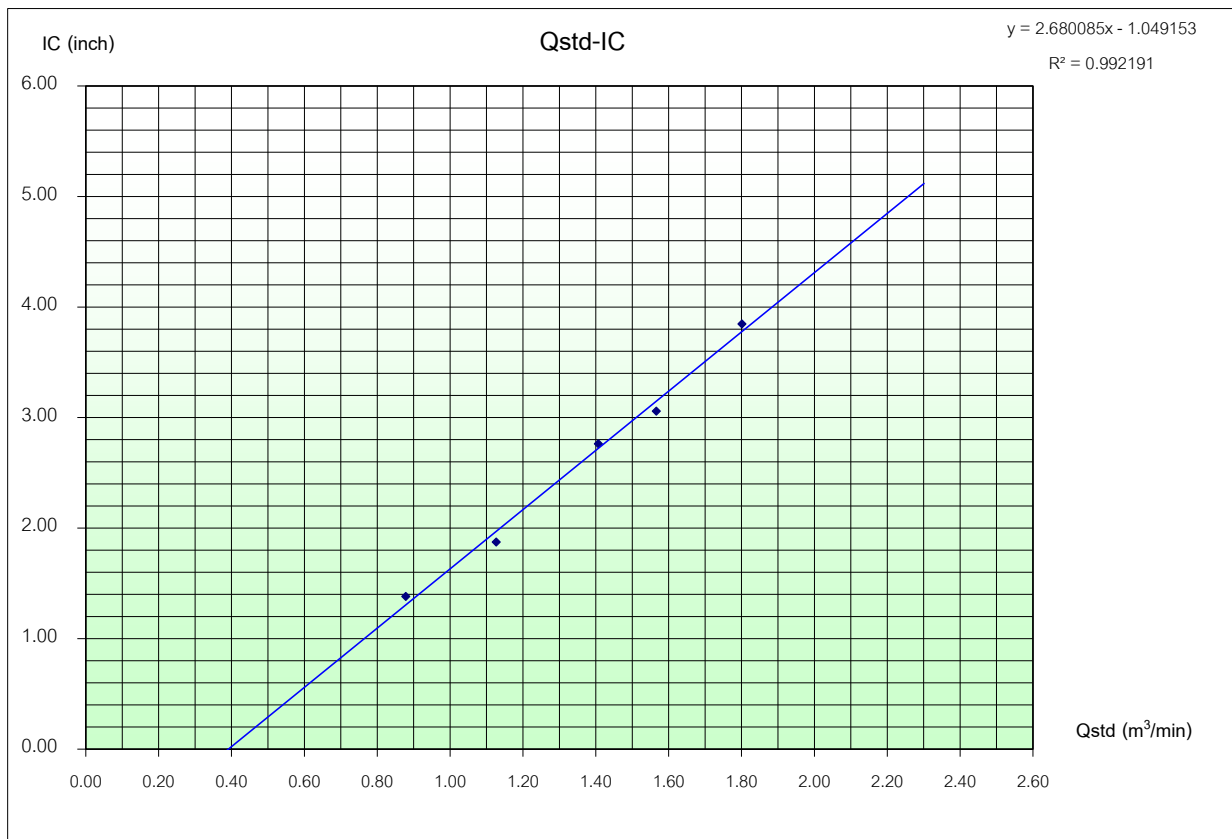
Plate No.	(Delta H)			(A)	(X)	(I)	(Y)	Temperature	Barometric Pressure	Start Meter	Stop Meter
	Pressure Drop Across Orifice (inH ₂ O)			$[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	Qstd = (1/m)[(A-b)] (m ³ /min)	Sample Flow Rate Indicator (inch)	$IC = [[(Pa/P_{std})(T_{std}/Ta)]^{1/2}]$	("K = °C+273)	(mmHg)		
	Positive	Negative	ΔH_2O								
5	1.5	1.5	3.0	1.70868	0.87849	1.4	1.38	305.0	757.0		
7	2.4	2.5	4.9	2.18372	1.12676	1.9	1.87	305.0	757.0		
10	3.8	3.8	7.6	2.71961	1.40682	2.8	2.76	305.0	757.0		
13	4.7	4.7	9.4	3.02457	1.56620	3.1	3.06	305.0	757.0		
18	6.2	6.2	12.4	3.47384	1.80099	3.9	3.85	305.0	757.0		

Linear Regression Y ON X : Y= mX + b

1	Slope (m)	1.91345	Linear Equation			r^2	0.992314	Pstd(mmHg)	760.0
2	Intercept (b)	0.02773	Set Point Flow Rate (X) (m ³ /min)	1.133		r	0.9961496	T _{NTP}	298.0
3	Correlation Coefficient (r)	0.99995	Final Set Flow Rate = (I)	0		(Pa/Pstd)*(Tstd/Ta)		0.973192407	
Result						C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.986505148	

COMMENT

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PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

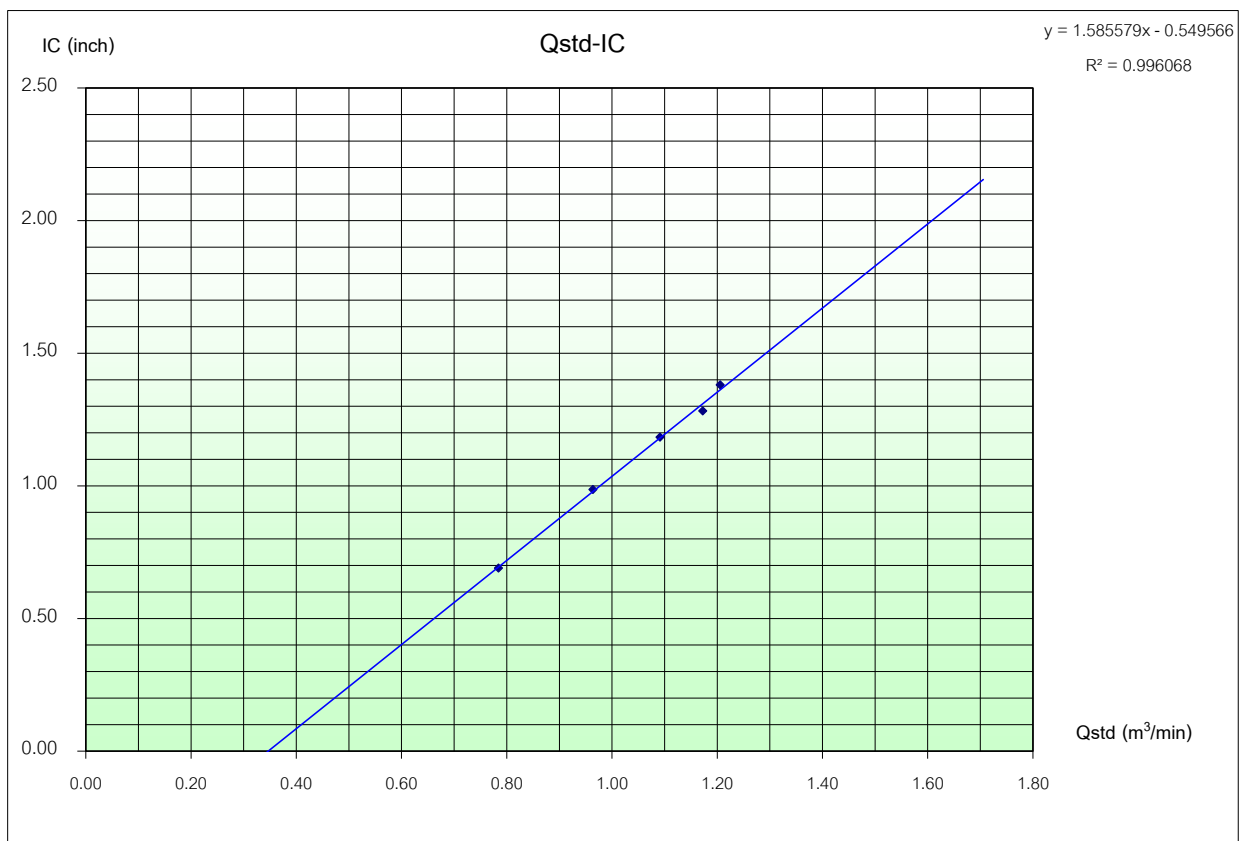
Sampler Location				Date	January 13, 2024
Project Site				Start Time	1:15 PM
Sampler Number	PM-10 No.1	Transfer Standard Type	Orifice	Stop Time	1:20 PM
Motor Serial Number	HVL-01	Calibrator Model	TE-5025A	Person	
Recorder Serial Number	-	Calibrator Serial Number	1		

Plate No.	(Delta H)			(A)	(X)	(I)	(Y)	Temperature	Barometric Pressure	Start Meter	Stop Meter
	Pressure Drop Across Orifice (inH ₂ O)			$[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	$Q_{std} = (1/m)[(A-b)]$ (m ³ /min)	Sample Flow Rate Indicator (inch)	$IC = [[(Pa/P_{std})(T_{std}/Ta)]^{1/2}]$	("K = °C+273)	(mmHg)		
	Positive	Negative	ΔH_2O								
5	1.2	1.2	2.4	1.52829	0.78422	0.7	0.69	305.0	757.0		
7	1.8	1.8	3.6	1.87176	0.96372	1.0	0.99	305.0	757.0		
10	2.3	2.3	4.6	2.11582	1.09127	1.2	1.18	305.0	757.0		
13	2.6	2.7	5.3	2.27111	1.17242	1.3	1.28	305.0	757.0		
18	2.8	2.8	5.6	2.33450	1.20555	1.4	1.38	305.0	757.0		

Linear Regression Y ON X : Y= mX + b							Average	305.0	757.0		
1	Slope (m)	1.91345	Linear Equation				r^2	0.987743	Pstd(mmHg)	760.0	
2	Intercept (b)	0.02773	Set Point Flow Rate (X) (m ³ /min)			1.133	r	0.9938526	T _{NTP}	298.0	
3	Correlation Coefficient (r)	0.99995	Final Set Flow Rate = (I)			0	(Pa/Pstd)*(Tstd/Ta)		0.973192407		
Result								$C = (Pa/Pstd) * (Tstd/Ta)^{0.5}$		0.986505148	

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TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Sampler Location		Date		January 13, 2024	
Project Site		Start Time		9:15 AM	
Sampler Number	TSP No.3	Transfer Standard Type	Orifice	Stop Time	9:20 AM
Motor Serial Number	BL-03	Calibrator Model	TE-5025A	Person	
Recorder Serial Number	-	Calibrator Serial Number	1		

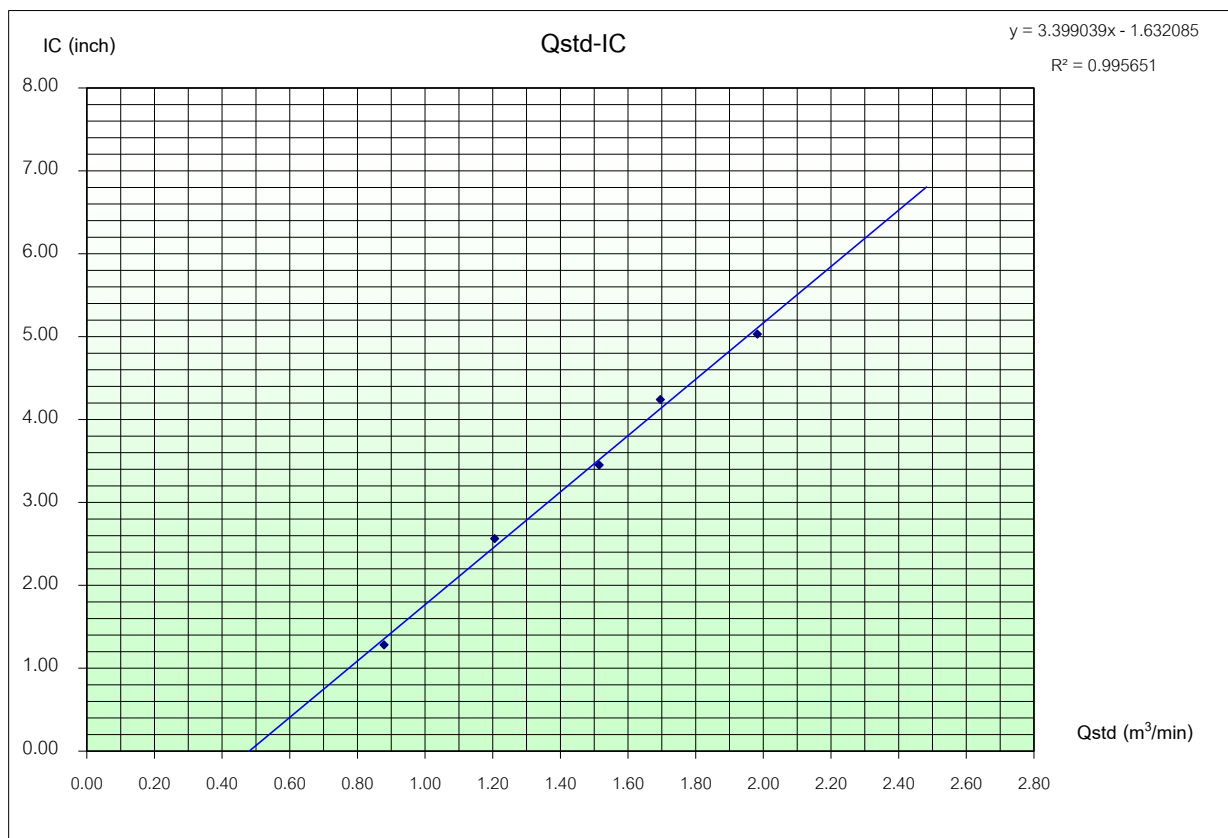
Plate No.	(Delta H)			(A)	(X)	(I)	(Y)	Temperature	Barometric Pressure	Start Meter	Stop Meter
	Pressure Drop Across Orifice (inH ₂ O)			$[\Delta H_2O(Pa/P_{std})(T_{std}/T_a)]^{1/2}$	$Q_{std} = (1/m)[(A-b)]$ (m ³ /min)	Sample Flow Rate Indicator (inch)	$IC = [[(Pa/P_{std})(T_{std}/T_a)]^{1/2}]$	("K = °C+273)	(mmHg)		
	Positive	Negative	ΔH_2O								
5	1.5	1.5	3.0	1.70868	0.87849	1.3	1.28	305.0	757.0		
7	2.8	2.8	5.6	2.33450	1.20555	2.6	2.56	305.0	757.0		
10	4.4	4.4	8.8	2.92645	1.51492	3.5	3.45	305.0	757.0		
13	5.5	5.5	11.0	3.27187	1.69544	4.3	4.24	305.0	757.0		
18	7.5	7.5	15.0	3.82072	1.98228	5.1	5.03	305.0	757.0		

Linear Regression Y ON X : Y= mX + b

1	Slope (m)	1.91345	Linear Equation			r^2	0.930028	Pstd(mmHg)	760.0
2	Intercept (b)	0.02773	Set Point Flow Rate (X) (m ³ /min)		1.133	r	0.9643796	T _{NTP}	298.0
3	Correlation Coefficient (r)	0.99995	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.973192407	
Result						C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.986505148	

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PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Sampler Location				Date	January 13, 2024
Project Site				Start Time	1:35 PM
Sampler Number	PM-10 No.3	Transfer Standard Type	Orifice	Stop Time	1:40 PM
Motor Serial Number	HVL-03	Calibrator Model	TE-5025A	Person	
Recorder Serial Number	-	Calibrator Serial Number	1		

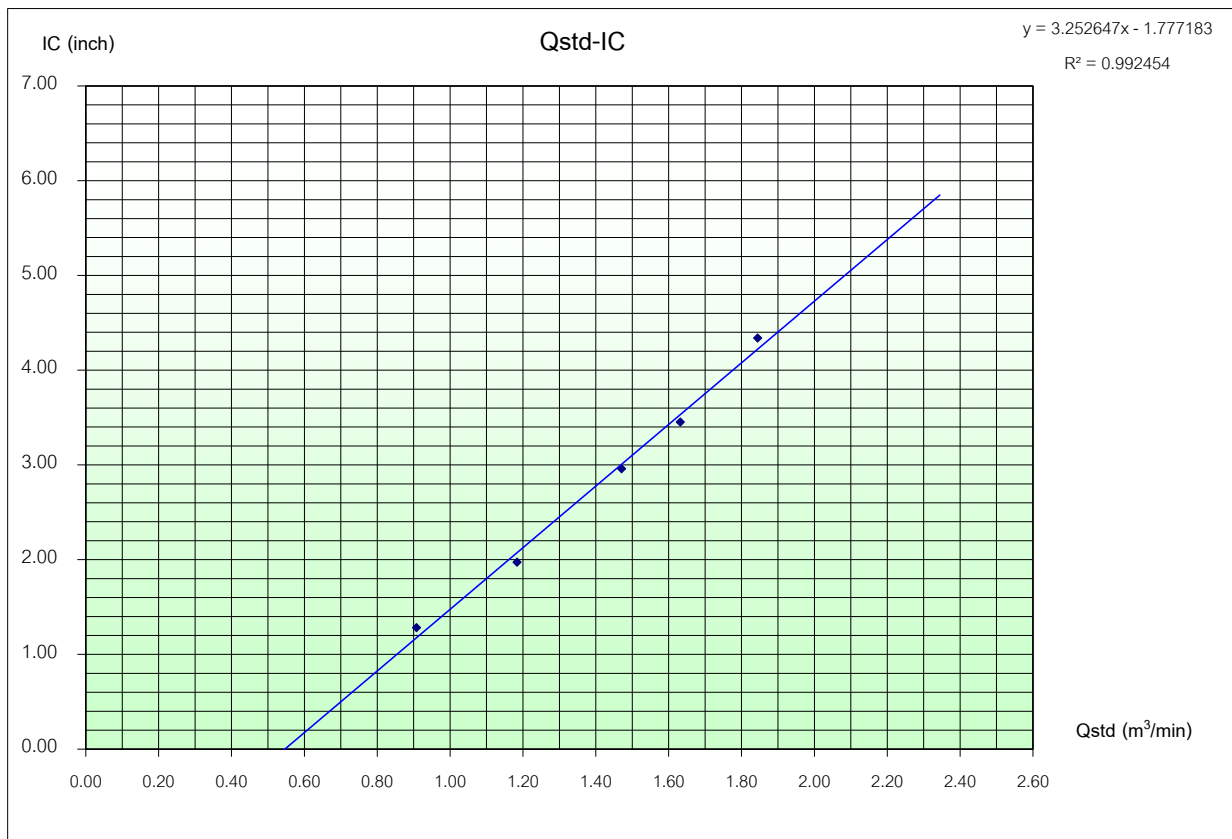
Plate No.	(Delta H)			(A)	(X)	(I)	(Y)	Temperature	Barometric Pressure	Start Meter	Stop Meter
	Pressure Drop Across Orifice (inH ₂ O)			$[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	$Q_{std} = (1/m)[(A-b)]$ (m ³ /min)	Sample Flow Rate Indication (inch)	$IC = [[(Pa/P_{std})(T_{std}/Ta)]^{1/2}]$	("K = °C+273)	(mmHg)		
	Positive	Negative	ΔH_2O								
5	1.6	1.6	3.2	1.76471	0.90778	1.3	1.28	305.0	757.0		
7	2.7	2.7	5.4	2.29243	1.18357	2.0	1.97	305.0	757.0		
10	4.1	4.2	8.3	2.84209	1.47083	3.0	2.96	305.0	757.0		
13	5.1	5.1	10.2	3.15064	1.63209	3.5	3.45	305.0	757.0		
18	6.5	6.5	13.0	3.55689	1.84440	4.4	4.34	305.0	757.0		

Linear Regression Y ON X : Y= mX + b

1	Slope (m)	1.91345	Linear Equation			r^2	0.942435	Pstd(mmHg)	760.0
2	Intercept (b)	0.02773	Set Point Flow Rate (X) (m ³ /min)	1.133		r	0.9707909	T _{NTP}	298.0
3	Correlation Coefficient (r)	0.99995	Final Set Flow Rate = (I)	0		(Pa/Pstd)*(Tstd/Ta)		0.973192407	
Result						C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.986505148	

COMMENT

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TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Sampler Location				Date	January 13, 2024
Project Site				Start Time	10:15 AM
Sampler Number	TSP No.9	Transfer Standard Type	Orifice	Stop Time	10:20 AM
Motor Serial Number	BL-09	Calibrator Model	TE-5025A	Person	
Recorder Serial Number	-	Calibrator Serial Number	1		

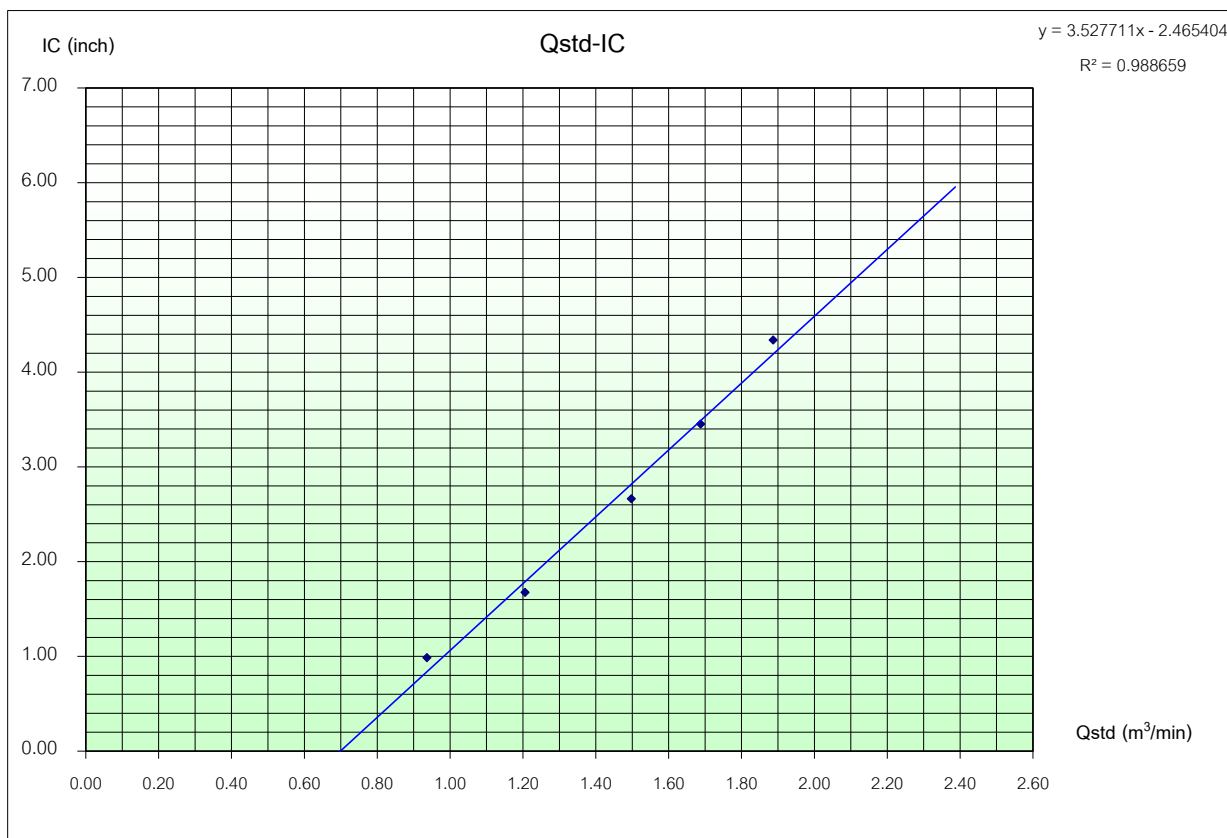
Plate No.	(Delta H)			(A)	(X)	(I)	(Y)	Temperature	Barometric Pressure	Start Meter	Stop Meter
	Pressure Drop Across Orifice (inH ₂ O)			$[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	$Q_{std} = (1/m)[(A-b)]$ (m ³ /min)	Sample Flow Rate Indication (inch)	$IC = [[(Pa/P_{std})(T_{std}/Ta)]^{1/2}]$	("K = °C+273)	(mmHg)		
	Positive	Negative	ΔH_2O								
5	1.7	1.7	3.4	1.81903	0.93616	1.0	0.99	305.0	757.0		
7	2.8	2.8	5.6	2.33450	1.20555	1.7	1.68	305.0	757.0		
10	4.3	4.3	8.6	2.89300	1.49744	2.7	2.66	305.0	757.0		
13	5.4	5.5	10.9	3.25696	1.68765	3.5	3.45	305.0	757.0		
18	6.8	6.8	13.6	3.63805	1.88681	4.4	4.34	305.0	757.0		

Linear Regression Y ON X : Y= mX + b

Linear Regression: Pstd*(X+I)^0.5			Average		305.0	757.0		
1	Slope (m)	1.91345	Linear Equation		r^2	0.9857	Pstd(mmHg)	760.0
2	Intercept (b)	0.02773	Set Point Flow Rate (X) (m ³ /min)	1.133	r	0.9928243	T _{NTP}	298.0
3	Correlation Coefficient (r)	0.99995	Final Set Flow Rate = (I)	0	(Pa/Pstd)*(Tstd/Ta)		0.973192407	
Result				C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.986505148		

COMMENT

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Division Manager



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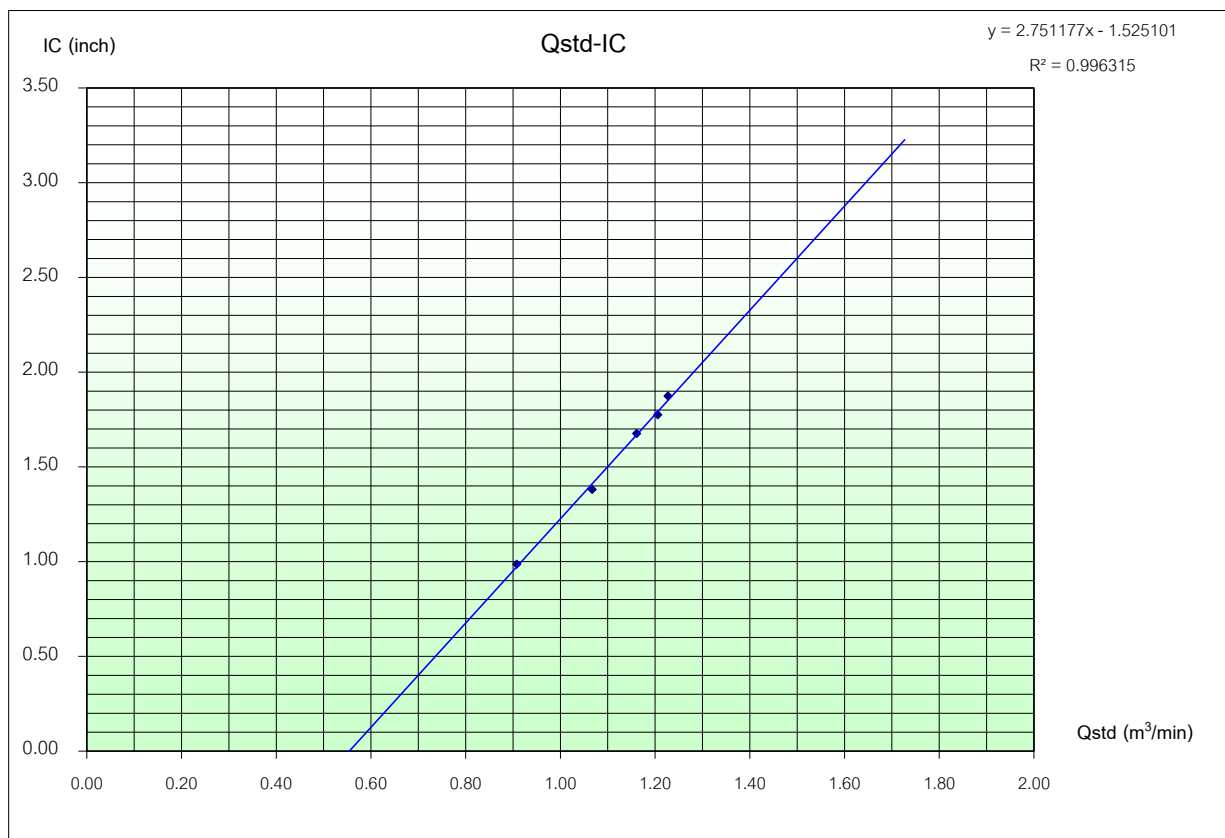
Sampler Location				Date	January 13, 2024
Project Site				Start Time	2:20 PM
Sampler Number	PM-10 No.9	Transfer Standard Type	Orifice	Stop Time	2:25 PM
Motor Serial Number	HVL-09	Calibrator Model	TE-5025A	Person	
Recorder Serial Number	-	Calibrator Serial Number	1		

Plate No.	(Delta H)			(A)	(X)	(I)	(Y)	Temperature	Barometric Pressure	Start Meter	Stop Meter
	Pressure Drop Across Orifice (inH ₂ O)			$[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	$Q_{std} = (1/m)[(A-b)]$ (m ³ /min)	Sample Flow Rate Indicator (inch)	$IC = [[(Pa/P_{std})(T_{std}/Ta)]^{1/2}]$	("K = °C+273)	(mmHg)		
	Positive	Negative	ΔH_2O								
5	1.6	1.6	3.2	1.76471	0.90778	1.0	0.99	305.0	757.0		
7	2.2	2.2	4.4	2.06931	1.06696	1.4	1.38	305.0	757.0		
10	2.6	2.6	5.2	2.24958	1.16117	1.7	1.68	305.0	757.0		
13	2.8	2.8	5.6	2.33450	1.20555	1.8	1.78	305.0	757.0		
18	2.9	2.9	5.8	2.37582	1.22715	1.9	1.87	305.0	757.0		

Linear Regression Y ON X : Y= mX + b				Average		305.0	757.0			
1	Slope (m)	1.91345	Linear Equation			r^2	0.997347	Pstd(mmHg)	760.0	
2	Intercept (b)	0.02773	Set Point Flow Rate (X) (m ³ /min)		1.133	r	0.9986726	T _{NTP}	298.0	
3	Correlation Coefficient (r)	0.99995	Final Set Flow Rate = (I)		0	$(Pa/P_{std})(T_{std}/Ta)$			0.973192407	
Result							$C=(Pa/P_{std})(T_{std}/Ta)^{0.5}$			0.986505148

COMMENT

Andersen Instruments, Inc.



Calibrated By

Field Environmental

Approved By

Division Manager



บริษัท เอ็นไวร์ เซอร์วิส จำกัด

42 รามอินทรา 14 แยก 9 แขวงท่าแร้ง เขตบางเขน กรุงเทพฯ 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201
บริษัท เอ็นไวร์ เซอร์วิส จำกัด 42 Raminthra 14 yeak 9, Tha Rang, Bangkhen, Bankok 10230 Tel : 02-9435814-5 Fax : 02-9438201
ENVIR SERVICE CO., LTD.

Analyzer Performance Test

Calibrated Date: 01 March 2024

Instruments Information

Analyzer Type: SO2 Analyzer Model: 43C	Manufacturer Thermo Environmental S/N: 335003719
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Calibration System

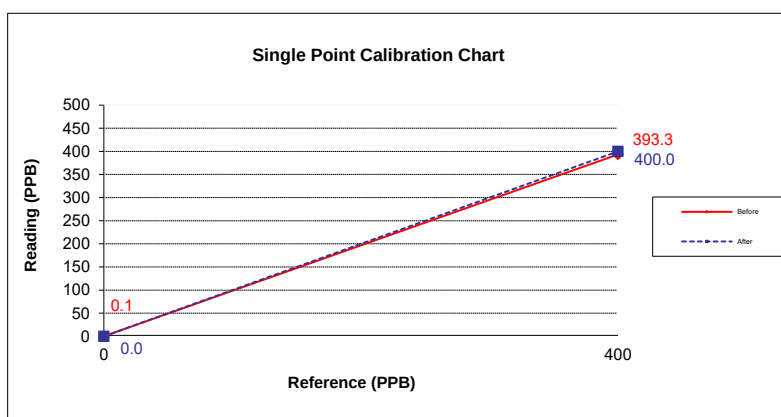
Calibrator Unit	Standard Gas
Dilutor Model Dasibi Model 5008 S/N: 705 ZERO AIR Generator API MODEL 701 S/N: 1924	NO Conc 55.47 PPM SO2 Conc 55.11 PPM CO Conc 4,535 PPM Cylinder number EB0129027 Expire Date: 29 Oct. 2027

Environment: Temperature 25.5 °C

Humidity: 51 %RH

Calibration Report

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



Calibrate By :





บริษัท เอ็นไวร์ เซอร์วิส จำกัด

42 รามอินทรา 14 แยก 9 แขวงท่าแร้ง เขตบางเขน กรุงเทพฯ 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201
บริษัท เอ็นไวร์ เซอร์วิส จำกัด 42 Raminthra 14 yeak 9, Tha Rang, Bangkhen, Bangkok 10230 Tel : 02-9435814-5 Fax : 02-9438201
ENVIR SERVICE CO., LTD.

Analyzer Performance Test

Calibrated Date: 01 March 2024

Instruments Information

Analyzer Type: SO2 Analyzer Model: 43C	Manufacturer Thermo Environmental S/N: 71354368
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Calibration System

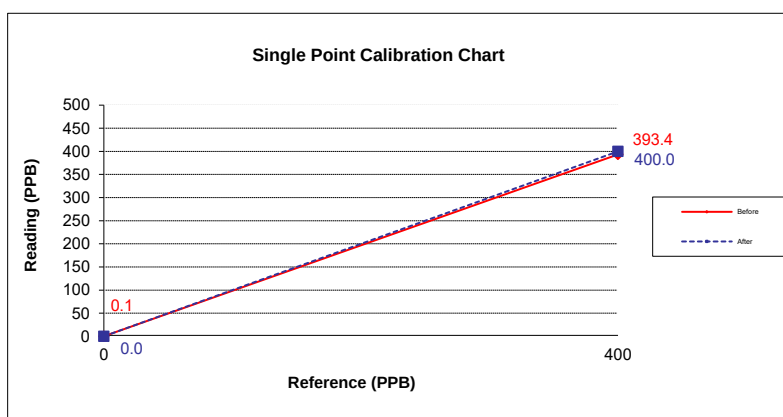
Calibrator Unit	Standard Gas
Dilutor Model Dasibi Model 5008 S/N: 705 ZERO AIR Generator API MODEL 701 S/N: 1924	NO Conc 55.47 PPM SO2 Conc 55.11 PPM CO Conc 4,535 PPM Cylinder number EB0129027 Expire Date: 29 Oct. 2027

Environment: Temperature 25.5 °C

Humidity: 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.1	0.1	400.0	393.4	-1.7
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By :



บริษัท เอ็นไวร์ เซอร์วิส จำกัด

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บริษัท เอ็นไวร์ เซอร์วิส จำกัด 42 Raminthra 14 yeak 9, Tha Rang, Bangkhen, Bankok 10230 Tel : 02-9435814-5 Fax : 02-9438201
ENVIR SERVICE CO., LTD.

Analyzer Performance Test

Calibrated Date: 01 March 2024

Instruments Information

Analyzer Type: SO2 Analyzer Model: 50	Manufacturer ECOTECH S/N: E020050
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Calibration System

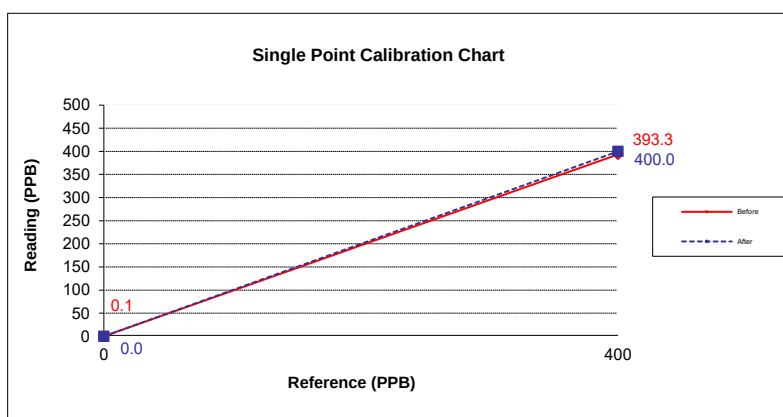
Calibrator Unit	Standard Gas
Dilutor Model Dasibi Model 5008 S/N: 705 ZERO AIR Generator API MODEL 701 S/N: 1924	NO Conc 55.47 PPM SO2 Conc 55.11 PPM CO Conc 4,535 PPM Cylinder number EB0129027 Expire Date: 29 Oct. 2027

Environment: Temperature 25.5 °C

Humidity: 51 %RH

Calibration Report

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



Calibrate By :





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บริษัท เอ็นไวร์ เซอร์วิส จำกัด 42 Raminthra 14 yeak 9, Tha Rang, Bangkhen, Bangkok 10230 Tel : 02-9435814-5 Fax : 02-9438201
ENVIR SERVICE CO., LTD.

Analyzer Performance Test

Calibrated Date: 01 March 2024

Instruments Information

Analyzer Type: SO2 Analyzer Model: 100A	Manufacturer API S/N: 193
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Calibration System

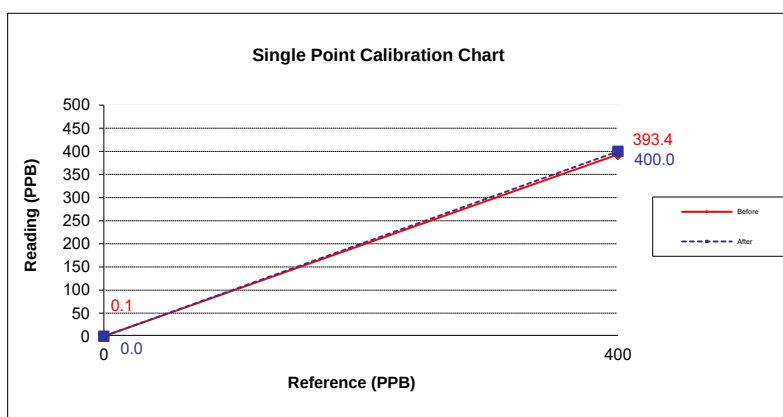
Calibrator Unit	Standard Gas
Dilutor Model Dasibi Model 5008 S/N: 705 ZERO AIR Generator API MODEL 701 S/N: 1924	NO Conc 55.47 PPM SO2 Conc 55.11 PPM CO Conc 4,535 PPM Cylinder number EB0129027 Expire Date: 29 Oct. 2027

Environment: Temperature 25.5 °C

Humidity: 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.1	0.1	400.0	393.4	-1.7
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By :



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42 รามอินทรา 14 แยก 9 แขวงท่าแร้ง เขตบางเขน กรุงเทพฯ 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201

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Analyzer Performance Test

Calibrated Date: 01 March 2024

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer Thermo Environmental S/N: 72706374
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Calibration System

Calibrator Unit	Standard Gas
Dilutor Model Dasibi Model 5008 S/N: 705 ZERO AIR Generator API Model 701 S/N: 1924	NO Conc 46.05 PPM SO2 Conc 46.01 PPM CO Conc 4,487 PPM Cylinder number CC507080 Expire Date: 23 Jul. 2025

Environment: Temperature 25.5 °C

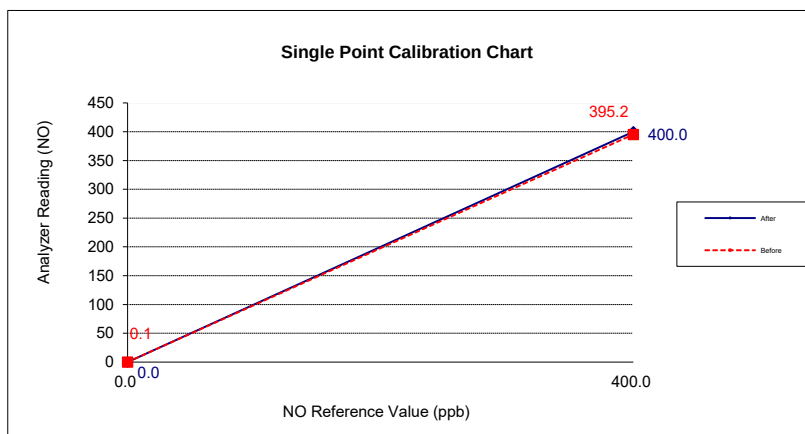
Humidity: 51 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.1	0.0	0.1	395.2	400.0	-1.2
NOx	0.1	0.0	0.1	400.0	400.0	0.0

Calibration Check (After adjust)

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



Calibrate By : M



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42 Raminthra 14 yeak 9, Tha Rang, Bangkhen, Bankok 10230 Tel : 02-9435814-5 Fax : 02-9438201

Analyzer Performance Test

Calibrated Date: 01 March 2024

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 40	Manufacturer ECOTECH S/N: E020040
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Calibration System

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

Environment: Temperature 25.5 °C

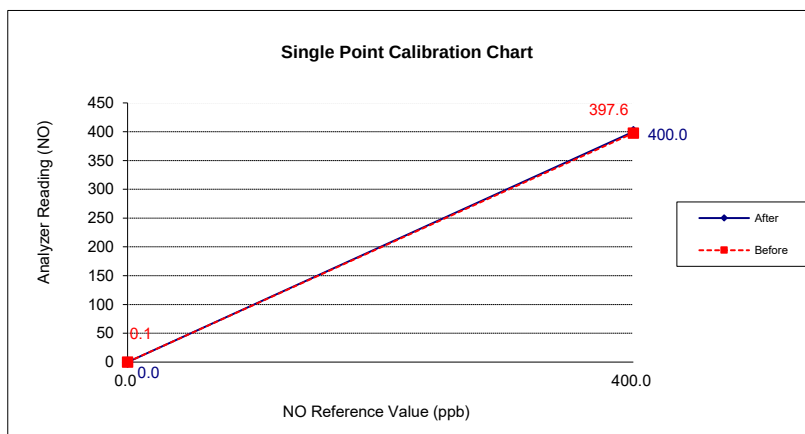
Humidity: 51 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.1	0.0	0.1	397.6	400.0	-0.6
NOx	0.1	0.0	0.1	400.0	400.0	0.0

Calibration Check (After adjust)

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



Calibrate By :



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42 Raminthra 14 yeak 9, Tha Rang, Bangkhen, Bankok 10230 Tel : 02-9435814-5 Fax : 02-9438201

Analyzer Performance Test

Calibrated Date: 01 March 2024

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer Thermo Environmental S/N: 72706371
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Calibration System

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

Environment: Temperature 25.5 °C

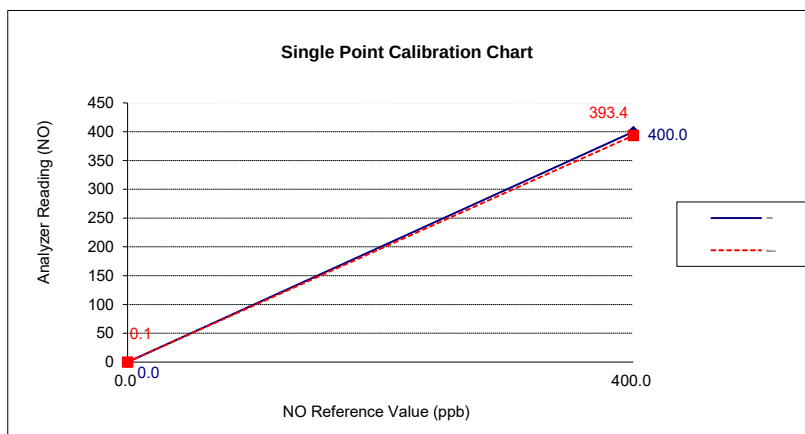
Humidity: 51 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.1	0.0	0.1	393.4	400.0	-1.7
NOx	0.1	0.0	0.1	396.7	400.0	-0.8

Calibration Check (After adjust)

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



Calibrate By :





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42 Raminthra 14 yeak 9, Tha Rang, Bangkhen, Bankok 10230 Tel : 02-9435814-5 Fax : 02-9438201

Analyzer Performance Test

Calibrated Date: 01 March 2024

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer Thermo Environmental S/N: 601114773
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Calibration System

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

Environment: Temperature 25.5 °C

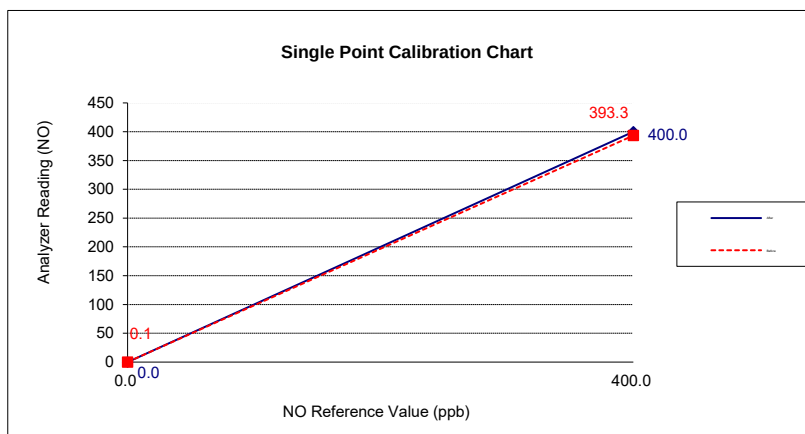
Humidity: 51 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.1	0.0	0.1	393.3	400.0	-1.7
NOx	0.1	0.0	0.1	396.4	400.0	-0.9

Calibration Check (After adjust)

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



Calibrate By :

Calibration Test

Calibrated Date: 27/2/2024

Certificate No. 024/24

Instruments Information

Manufacturer : YOUNG Instrument Type : four blade helicoid propeller
Model : 40C Serial Number : Logger 309018964

Environment : Temperature 25.5 °C Humidity: 51 %RH

NATIONAL STANDARD WIND TUNNEL : Thermal Anemometer 642 S/N 91563
: HOOK GAGE NO 1425 : Wind Aloft Plotting Board
N.I.S.T. Test Reference Number 731/241460
: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586) JAPAN QUALITY ASSURANCE ORGANIZATION

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO 1425			TESTED ANEMOMETER			
	Pressure inches	Vacuum inches	Pressure hPa	Pressure hPa	Correction hPa	Velocity m/sec	Correction m/sec
1.00	-	-	-	-	-	0.9	0.10
3.02	-	-	-	-	-	2.8	0.22
5.04	-	-	-	-	-	4.9	0.14
7.03	-	-	-	-	-	6.8	0.23
9.01	-	-	-	-	-	8.8	0.21
11.03	-	-	-	-	-	10.7	0.33
13.01	-	-	-	-	-	12.6	0.41
15.03	-	-	-	-	-	14.4	0.63
17.05	-	-	-	-	-	16.5	0.55
20.02	-	-	-	-	-	19.4	0.62

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

Calibrate By :

Approve by :

Envi Equipment Service Co., Ltd.

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

Tel. 098 362 9152, 089 478 7885

E-mail: sales@envi-ees.com

Certificate No.: E24-010020

Page.: 1 of 6

CERTIFICATE OF CALIBRATION

Customer : M E T COMPANY LIMITED

Address : 36/659 Moo 6, Bangrakpatthana, Bangbuathong, Nonthaburi 11110

Description of Equipment : Console meter

Manufacturer : Apex Instrument

Model Number : TMC-572-V

Serial Number : A2202103

ID./Control No. : -

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

Cal. Date : 16/01/2024

Issue Date : 16/01/2024

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

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

Result of Calibration

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

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

Calibrated by :

[Redacted Signature]

Approved by :

[Redacted Signature]

Technical Manger



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

Meter Console Information		Calibration Conditions				Factors/Conversions		
Console Model Number	TMC-572-V	Date	Time	16/01/2024	12:50 PM	Std Temp	293	K
Console Serial Number	A2202103	Calibration Reference No.		SER24-010006		Std Press	760	mm Hg
DGM Model Number	SK25EX	Barometric Pressure		759.74		K ₁	0.386	
DGM Serial Number	00006345	Calibration Meter Gamma		0.999		Console Leak Check		PASS

Calibration Data									
Run Time	Metering Console					Calibration Meter			
Elapsed	DGM Orifice DH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final
(Q)	(P _m)	(V _{mi})	(V _{mf})	(t _{mi})	(t _{mf})	(V _{wi})	(V _{wf})	(t _{wi})	(t _{wf})
min	mm H ₂ O	m ³	m ³	°C	°C	m ³	m ³	°C	°C
11.95	13.0	182.4280	182.5680	28	28	198.19414	198.33274	24	24
11.97	13.0	182.5680	182.7080	26	26	198.33274	198.47222	24	24
8.57	26.0	182.7170	182.8570	25	25	198.48132	198.62164	23	23
8.55	26.0	182.8570	182.9970	25	25	198.62164	198.76196	23	23
13.68	40.0	183.0090	183.2890	25	25	198.77394	199.05432	23	23
13.67	40.0	183.2890	183.5690	26	26	199.05432	199.33400	23	23
10.37	70.0	183.5820	183.8620	26	26	199.34686	199.62560	23	23
10.33	70.0	183.8620	184.1420	27	27	199.62560	199.90342	23	23
9.22	90.0	184.1550	184.4350	27	27	199.91622	200.19328	23	23
9.18	90.0	184.4350	184.7150	27	27	200.19328	200.46956	23	23



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

Meter Console Information		Calibration Conditions				Factors/Conversions		
Console Model Number	TMC-572-V	Date	Time	16/01/2024	12:50 AM	Std Temp	293	K
Console Serial Number	A2202103	Calibration Reference No.		SER24-010006		Std Press	760	mm Hg
DGM Model Number	SK25EX	Barometric Pressure		759.74		K ₁	0.386	
DGM Serial Number	00006345	Calibration Meter Gamma		0.999		Console Leak Check		PASS

Calibration Data								
Results								
Standardized Data				Dry Gas Meter				
Dry Gas Meter		Calibration Meter		Calibration Factor		Flowrate		
(V _{m(std)})	(Q _{m(std)})	(V _{w(std)})	(Q _{w(std)})	Value	Variation	Std & Corr	.0212 m ³ _{std} /min	Variation
m ³	m ³ /min	m ³	m ³ /min	(Y)	(ΔY)	(Q _{m(std)} (corr))	(ΔH _@)	(ΔH _@)
						m ³ /min	mm H ₂ O	
0.138	0.012	0.137	0.011	0.988	-0.002	0.011	44.386	-0.313
0.138	0.012	0.137	0.011	0.994	0.004	0.011	43.950	-0.749
0.139	0.016	0.139	0.016	0.999	0.009	0.016	44.471	-0.228
0.139	0.016	0.139	0.016	0.999	0.009	0.016	44.298	-0.401
0.278	0.020	0.277	0.020	0.996	0.007	0.020	43.837	-0.862
0.278	0.020	0.276	0.020	0.994	0.004	0.020	43.949	-0.749
0.279	0.027	0.276	0.027	0.988	-0.002	0.027	44.810	0.112
0.279	0.027	0.275	0.027	0.985	-0.005	0.027	44.818	0.119
0.279	0.030	0.274	0.030	0.980	-0.010	0.030	46.271	1.572
0.279	0.030	0.273	0.030	0.977	-0.013	0.030	46.197	1.498
				0.990	Y Average		44.699	ΔH _@ Average

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ±0.02.

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



Meter Console Information	
Console Model Number	TMC-572-V
Console Serial Number	A2202103
DGM Model Number	SK25EX
DGM Serial Number	00006345

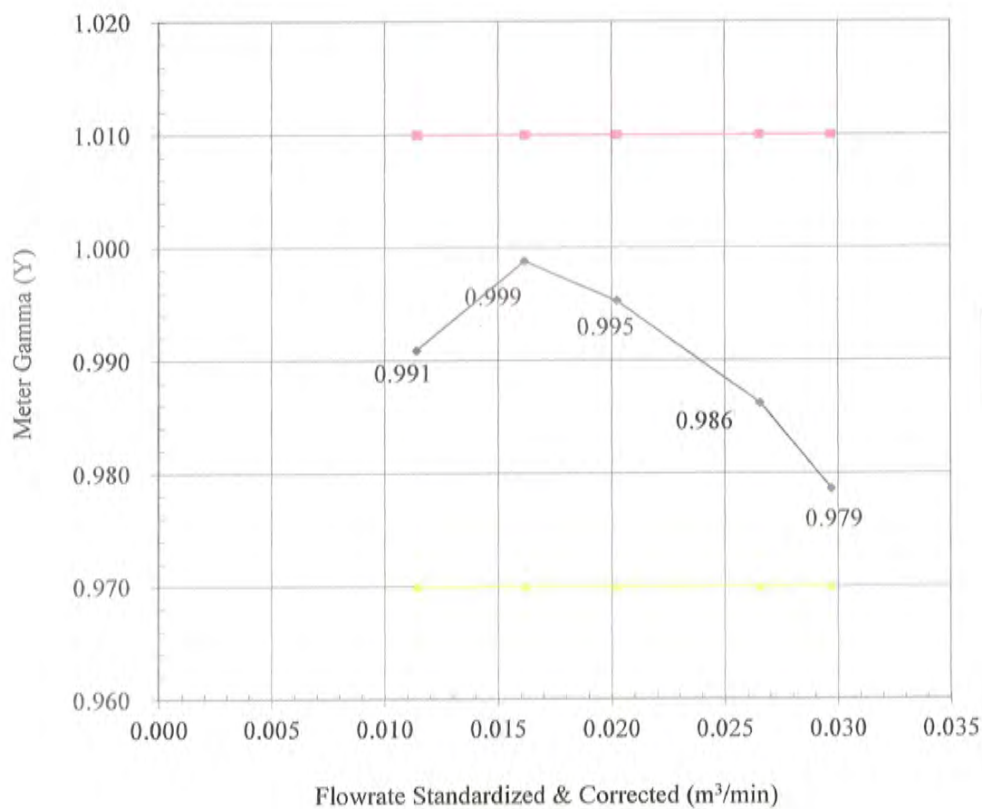
Calibration Conditions			
Date	Time	16/01/2024	12:50 AM
Calibration Reference No.		SER24-010006	
Barometric Pressure		759.74	mmHg
Calibration Meter Gamma		0.999	

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

Calibration Date: 16-1-2024

Calibration Reference No: SER24-010006

Meter Gamma vs Flowrate



Console Serial: A2202103

Console Model: TMC-572



Meter Console Information	
Console Model Number	TMC-572-V
Console Serial Number	A2202103
DGM Model Number	SK25EX
DGM Serial Number	00006345

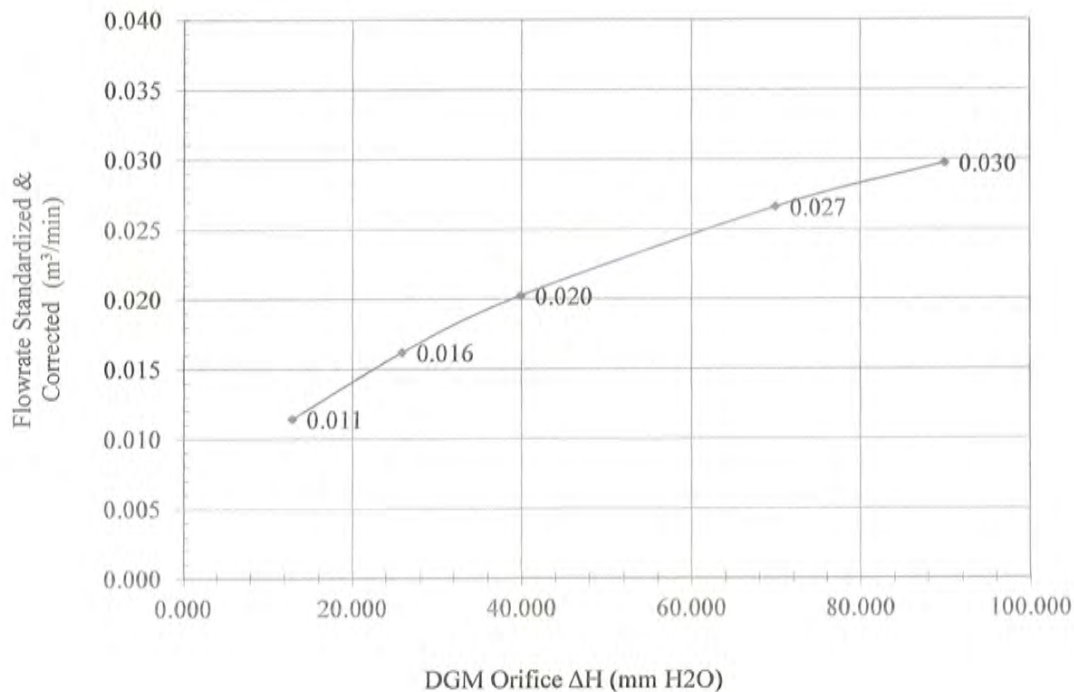
Calibration Conditions			
Date	Time	16/01/2024	12:50 AM
Calibration Reference No.		SER24-010006	
Barometric Pressure		761.24	mmHg
Calibration Meter Gamma		0.999	

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

Calibration Date: 16-1-2024

Calibration Reference No: SER24-010006

Meter Pressure vs Flowrate



Console Serial: A2202103

Console Model: TMC-572



THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information	
Console Model Number	TMC-572-V
Console Serial Number	A2202103
DGM Model Number	SK25EX
DGM Serial Number	00006345
Meter Box Model Number	JENCO 765 KF
Meter Box Serial Number	JC 18920

Calibration Conditions			
Date	Time	16/01/2024	03:15 PM
Calibration Reference No.		SER24-010006	
Reference Thermometer		DIGICON	
Serial Number		183169105	

Results											
Console Thermocouple Simulator											
Channel and test point	Meter Box Channel Temperature Reading (°C)										
	-18.0	25.0	38.0	93.0	149.0	260.0	371.0	482.0	593.0	816.0	1038.0
Stack	-17.0	24.0	38.0	94.0	150.0	260.0	372.0	483.0	594.0	817.0	1040.0
Aux	-17.0	24.0	37.0	93.0	150.0						
Probe	-17.0	24.0	37.0	93.0	150.0						
Filter	-17.0	24.0	37.0	93.0	150.0						
Exit	-17.0	24.0	37.0								

Tolerance Range

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

Meter ± 3.0 °C
 Exit ± 2.0 °C



Envi Equipment Service Co., Ltd.

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

Tel. 098 362 9152, 089 478 7885

E-mail: sales@envi-ees.com

Certificate No. : E24-010021

Page. : 1 of 3

CERTIFICATE OF CALIBRATION

Customer : M E T COMPANY LIMITED

Address : 36/659 Moo 6, Bangrakpatthana, Bangbuathong, Nonthaburi 11110

Description of Equipment : Standard Probe Method 5

Manufacturer : Apex Instrument

Model Number : PS-3HV

Serial Number : -

ID./Control No. : -

Environment Conditions : **Temperature** (25 ± 2) °C

: **Humidity** (50 ± 15) % RH

Cal. Date : 16/01/2024

Issue Date : 16/01/2024

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

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

Result of Calibration

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

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

Calibrated by :



Approved by :



Technical Manger

CALIBRATION RESULTS

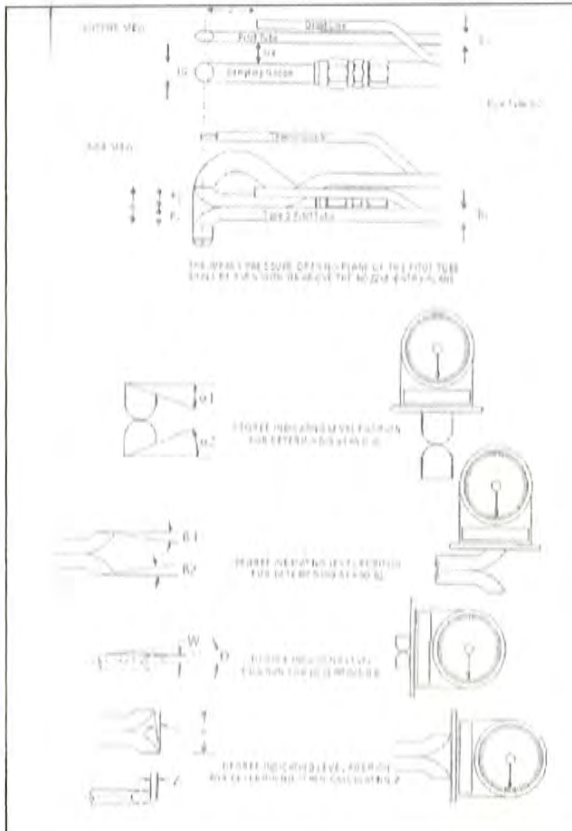
S-Type Geometric Pitot Tube Calibration

Sampling System Equipment Information

Probe Model	: PS-3HV
Probe Number	: -
Pitot Number	: A10664
Pitot Tube Type	: S-type

Calibration Condition

Date	: 16 January 2024
Barometric Pressure	: 759.74 mm Hg
Digital Caliper	: CD-6" ASX
Serial number	: A18008059

 Diagram 1: Side view of the probe assembly showing the Pitot tube, static ports, and the probe body. Labels include 'Probe', 'Pitot tube', 'Static ports', and 'Probe body'. Diagram 2: Top view of the probe assembly showing the probe body, Pitot tube, and static ports. Labels include 'Probe body', 'Pitot tube', and 'Static ports'. Diagram 3: Cross-section of the probe body showing the internal structure of the Pitot tube and static ports. Labels include 'Pitot tube', 'Static ports', and 'Probe body'. Diagram 4: Cross-section of the probe body showing the internal structure of the Pitot tube and static ports. Labels include 'Pitot tube', 'Static ports', and 'Probe body'. Diagram 5: Cross-section of the probe body showing the internal structure of the Pitot tube and static ports. Labels include 'Pitot tube', 'Static ports', and 'Probe body'. Diagram 6: Cross-section of the probe body showing the internal structure of the Pitot tube and static ports. Labels include 'Pitot tube', 'Static ports', and 'Probe body'. Diagram 7: Cross-section of the probe body showing the internal structure of the Pitot tube and static ports. Labels include 'Pitot tube', 'Static ports', and 'Probe body'. Diagram 8: Cross-section of the probe body showing the internal structure of the Pitot tube and static ports. Labels include 'Pitot tube', 'Static ports', and 'Probe body'. Diagram 9: Cross-section of the probe body showing the internal structure of the Pitot tube and static ports. Labels include 'Pitot tube', 'Static ports', and 'Probe body'. Diagram 10: Cross-section of the probe body showing the internal structure of the Pitot tube and static ports. Labels include 'Pitot tube', 'Static ports', and 'Probe body'. Diagram 11: Cross-section of the probe body showing the internal structure of the Pitot tube and static ports. Labels include 'Pitot tube', 'Static ports', and 'Probe body'. Diagram 12: Cross-section of the probe body showing the internal structure of the Pitot tube and static ports. Labels include 'Pitot tube', 'Static ports', and 'Probe body'. Diagram 13: Cross-section of the probe body showing the internal structure of the Pitot tube and static ports. Labels include 'Pitot tube', 'Static ports', and 'Probe body'. Diagram 14: Cross-section of the probe body showing the internal structure of the Pitot tube and static ports. Labels include 'Pitot tube', 'Static ports', and 'Probe body'.	Pitot tube/Probe: # PS-3HV			
	Parameter	Value	Allowable Range	Check
	Assembly level?	Yes	Yes	Pass
	Ports Damage?	No	No	Pass
	$\alpha 1$	0	$-10^{\circ} < \alpha 1 < +10^{\circ}$	Pass
	$\alpha 2$	1	$-10^{\circ} < \alpha 2 < +10^{\circ}$	Pass
	$\beta 1$	0	$-5^{\circ} < \beta 1 < +5^{\circ}$	Pass
	$\beta 2$	0	$-5^{\circ} < \beta 2 < +5^{\circ}$	Pass
	y	0	N/A	-
	θ	0	N/A	-
	Dt	0.375	.188 " to .375 "	Pass
	A	0.8685	$2.1Dt \leq A \leq 3Dt$	Pass
	A/2Dt	1.158	$1.05 \leq P_A/D_t \leq 1.5$	Pass
	$Z = A \tan y$	0.044	$Z \leq .125"$	Pass
	$W = A \tan \theta$	0.018	$W \leq .031"$	Pass

Remark:

I certified that probe model: **PS-3HV** and Pitot tube no. **A10664** meets or exceeds all specifications, criteria and/or applicable design and is hereby assigned a pitot tube certification factor of **0.84**. See 40 CFR Pt. 60, App. A, EPA Method 2.



THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information	
Probe Model Number	PS-3HV
Probe Serial Number	-
Meter Box Model Number	JENCO 765 KF
Meter Box Serial Number	JC 18920

Calibration Conditions			
Date	Time	16/01/2024	03:20 PM
Calibration Reference No.		E24-010006	
Reference Thermometer		DIGICON	
Serial Number		183169105	

Thermocouple of Standard Probe method 5 = length 3 foot			
Set Point	Reference Thermocouple	Probe Thermocouple	Difference
100	100.0	99.0	0.27
250	250.0	249.0	0.19
300	300.0	298.0	0.35
350	350.0	348.0	0.32



Envi Equipment Service Co., Ltd.

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

Tel. 098 362 9152, 089 478 7885

E-mail: sales@envi-ees.com

Certificate No.: E24-010022

Page.: 1 of 2

CERTIFICATE OF CALIBRATION

Customer : M E T COMPANY LIMITED

Address : 36/659 Moo 6, Bangrakpatthana, Bangbuathong, Nonthaburi 11110

Description of Equipment : Stainless Steel Nozzle

Manufacturer : Apex Instrument

Model Number : NS-SET

Serial Number : -

ID./Control No. : -

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

Cal. Date : 15/01/2024

Issue Date : 15/01/2024

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

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

Result of Calibration

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

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

Calibrated by :



Approved by :



Technical Manger



CALIBRATION RESULTS

Sampling System Equipment Information

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

Calibration Condition

Date : 15 January 2024
Barometric Pressure : 759.74 mm Hg
Calibration Device : Vernier, 0-150 mm
Method Reference : US. EPA Method

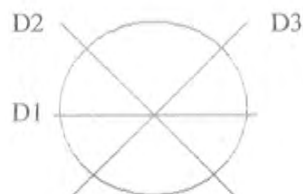
Nozzle ID	Nozzle Diameter				Different	(D1 + D2 + D3) / 3
Size		D1	D2	D3	ΔD	Davg
	mm	mm	mm	mm	mm	mm
NS-4	3.18	2.94	2.94	2.93	0.006	2.937
NS-5	3.97	4.03	4.01	4.03	0.012	4.023
NS-7	5.56	5.45	5.44	5.45	0.006	5.447
NS-8	6.35	6.06	6.06	6.08	0.012	6.067
NS-9	7.14	7.21	7.23	7.21	0.012	7.217
NS-12	9.53	9.43	9.41	9.42	0.010	9.420
NS-16	12.70	12.38	12.36	12.36	0.012	12.367

Remark:

D1, D2, D3 = There difference nozzle diameters, mm; diameter must be within 0.025 mm

ΔD = Maximum difference between any two diameters, must be ≤ 0.100 mm

Davg = $(D_1 + D_2 + D_3) / 3$





Bureau of Laboratory Quality Standards
Ministry of Public Health

This is to certify that

The Laboratory of

S.P.S. Consulting Service Co., Ltd.

7 Soi Phaholyothin 24, Phaholyothin Road, Jompol,
Chatuchak, Bangkok 10900, Thailand.

has been accepted as an
accredited laboratory complying with the ISO/IEC 17025 : 2017
and the requirements of the Bureau of Laboratory Quality Standards

The laboratory has been accredited for specific tests
listed in the scope within the field of

Food Testing

Director of Bureau of Laboratory Quality Standards

Date of Accreditation : 20 June 2019

Valid Until : 19 June 2021

Accreditation Number 1280/60

The Laboratory of S.P.S. Consulting Service Co., Ltd. has been accepted as
accredited laboratory in the field of food testing for the following scopes.

No.	Type of Sample	Test	Method
1.	• Potable water - Drinking water in sealed container - Drinking water in non-sealed container • Ice • Non-Potable water - Processed water - Cooling water - Tap water - Ground water - Surface water - Swimming pool water • Wastewater • Seawater	1. Coliforms	Standard Methods for the Examination of Water and Wastewater. APHA , AWWA , WEF, 23 rd Edition, 2017 , part 9221 (B)
		2. Fecal coliforms	Standard Methods for the Examination of Water and Wastewater. APHA , AWWA , WEF, 23 rd Edition, 2017 , part 9221 (E)
		3. E.coli	Standard Methods for the Examination of Water and Wastewater. APHA , AWWA , WEF, 23 rd Edition, 2017 , part 9221 (F)

Bureau of Laboratory Quality Standards

1 of 3

Issued : 00

Date Issued : 20 June 2019

Accreditation Number 1280/59

Date of Accreditation : 20 June 2019

Valid Until : 19 June 2021

Reviewed by Head of Laboratory Accreditation Section

The Laboratory of S.P.S. Consulting Service Co., Ltd. has been accepted as accredited laboratory in the field of food testing for the following scopes.

No.	Type of Sample	Test	Method
1.	- Potable water - Drinking water in scaled container - Drinking water in non-scaled container - Ice - Non-Potable water - Processed water - Cooling water - Tap water - Ground water - Surface water - Swimming pool water - Wastewater - Seawater	4. Total plate count	Standard Methods for the Examination of Water and Wastewater. APHA , AWWA , WEF, 23 rd Edition, 2017 , part 9215 (B)
		5. <i>Staphylococcus aureus</i>	Standard Methods for the Examination of Water and Wastewater. APHA , AWWA , WEF, 23 rd Edition, 2017 , part 9213 (B)
		6. <i>Pseudomonas aeruginosa</i>	Standard Methods for the Examination of Water and Wastewater. APHA , AWWA , WEF, 23 rd Edition, 2017 , part 9213(E)
		7. <i>Legionella</i>	Standard Methods for the Examination of Water and Wastewater. APHA , AWWA , WEF, 23 rd Edition, 2017 , part 9260 (J)
	(continue)		

Bureau of Laboratory Quality Standards

2 of 3

Issued : 00

Date Issued : 20 June 2019

Accreditation Number 1280/59

Date of Accreditation : 20 June 2019

Valid Until : 19 June 2021

Reviewed by Head of Laboratory Accreditation Section...

The Laboratory of S.P.S. Consulting Service Co., Ltd. has been accepted as accredited laboratory in the field of food testing for the following scopes.

No.	Type of Sample	Test	Method
1.	- Potable water - Drinking water in scaled container - Drinking water in non-scaled container - Ice - Non-Potable water - Processed water - Cooling water - Tap water - Ground water - Surface water - Swimming pool water - Wastewater - Seawater	8. <i>Salmonella</i> spp.	Standard Methods for the Examination of Water and Wastewater. APHA , AWWA , WEF, 23 rd Edition, 2017 , part 9260 (B)
		9. <i>Clostridium perfringens</i>	Standard Methods for the Examination of Water and Associated Materials, The Microbiology of Drinking Water (2010) , Environment Agency (EA) , UK
		10. Enterococci	Standard Methods for the Examination of Water and Wastewater. APHA , AWWA , WEF, 23 rd Edition, 2017 , part 9230 (C)
	(continue)		

Bureau of Laboratory Quality Standards

3 of 3

Issued : 00

Date Issued : 20 June 2019

Accreditation Number 1280/59

Date of Accreditation : 20 June 2019

Valid Until : 19 June 2021

Reviewed by Head of Laboratory Accreditation Section...



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD

214 Bangwaek Rd. Bangpai Bangkae Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Certificate No. : L202307315-0001

Date Issued : 04-Aug-23

Customer : S.P.S. CONSULTING SERVICE CO., LTD.
7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak,
Bangkok 10900

Equipment : Block Digestion (Gerhardt, TR)

Manufacturer : Gerhardt

Model : -

Serial No. : 4061832

ID No./Tag No. : KJ 01/43

Date Received : 27-Jul-23

Date Calibrated : 02-Aug-23

Calibrated by :

Calibration Method or Calibration Procedure Used

In-house method : CP-49 base on TLAS G-20 by comparing against Standard Thermometer.

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

Result of Calibration

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

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

Approved by:

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Page 1 of 2

Certificate No. : L202307315-0001

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

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

Calibration Temperature ($^{\circ}\text{C}$)	Setting Temperature ($^{\circ}\text{C}$)	Indicating Temperature ($^{\circ}\text{C}$)	Measured Stability ¹ ($^{\circ}\text{C}$)	Measured Uniformity ² ($^{\circ}\text{C}$)	Overall Variation ³ ($^{\circ}\text{C}$)
380	380	380	0.68	2.44	4.24

Calibration Temperature ($^{\circ}\text{C}$)	Standard Reading ($^{\circ}\text{C}$), Probe No. 20 is Reference Probe					Uncertainty ⁴ ($\pm^{\circ}\text{C}$)
380	No. 1	No. 2	No. 3	No. 4	No. 5	1.7
	378.41	378.85	377.25	377.79	378.29	
	No. 6	No. 7	No. 8	No. 9	No. 10	
	378.27	377.21	377.76	379.64	379.54	
	No. 11	No. 12	No. 13	No. 14	No. 15	
	378.18	379.62	378.53	379.15	378.98	
	No. 16	No. 17	No. 18	No. 19	No. 20	
	379.59	378.98	380.28	378.60	378.43	

Without adjustment

No.1	No.6	No.11	No.16
No.2	No.7	No.12	No.17
No.3	No.8	No.13	No.18
No.4	No.9	No.14	No.19
No.5	No.10	No.15	No.20

Top view position

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. L202302323-002 for Digital Thermometer with Probe (Agilent) Module 2 (172) Type K Serial No. US37011204, Due 09-Sep-23

- Notes :
1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.
 2. The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time.
 3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.
 4. The uncertainty of measurement is included temperature stability.

End of Certificate

Certificate of Calibration

Certificate No. : 66-420115-1

Page : 1 of 2

Submitted by : M E T Company Limited

36/659 Moo 6, T.Bangrakpattana, A.Bangbuatong, Nonthaburi 11110

Equipment : pH Meter with electrode

pH meter

Manufacturer : Hanna

Model : HI8424

Range : N/A pH

Resolution : 0.01 pH

Serial No. : 06160185101

ID No. : MET-pH08/64

Electrode

Model : HI1230

Serial No. : 0937487N

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

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

Date of Received : 16 November 2023

Date of Calibration : 23 November 2023

Date of Issue : 23 November 2023

Calibrated by :

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

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

1. Multiproduct Calibrator

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
440001	23E1240	24 Mar 2025	National Institute of Metrology Thailand (NIMT)

2. Certified Reference Material (CRM)

<u>pH</u>	<u>Cert. No.</u>	<u>Lot No.</u>	<u>Exp. Date</u>	<u>Traceability</u>
4.008	61270213	915161	19 Jul 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.985	61275614	898428	28 May 2024	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
9.997	61281073	915163	19 Jul 2024	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 66-420115-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

Adjustment Curve at nominal pH	Applied Voltage (mV)	Nominal Value (pH)	UUC Reading		Correction (mV)	Uncertainty (± mV)
			(pH)	(mV)		
4, 7	177.4800	4	4.00	177.4	0.1	0.060
	0.0000	7	7.00	0.0	0.0	0.058
7,10	0.0000	7	7.00	0.0	0.0	0.058
	-177.4800	10	10.00	-177.4	-0.1	0.060

Function : pH meter with electrode

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

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (± pH)
4, 7	4.008	4.01	0.00	0.0091
	6.985	7.01	-0.02	0.012
7, 10	6.985	7.01	-0.02	0.012
	9.997	10.01	-0.01	0.014

Remark

UUC : Unit Under Calibration

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

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

- 000 -



www.calibratech.co.th

Certificate of Calibration

Certificate No. : 66-400650-1

Page : 1 of 2

Submitted by : M E T Company Limited
36/659 Moo 6, T. Bangrakpattana, A. Bangbuatong, Nonthaburi 11110

Equipment : Digital Thermometer with NTC Probe
Temperature Indicator

Manufacturer : Hanna

Model : HI8424

Range : N/A

Resolution : 0.1 °C

Serial No. : 06160185101

ID No. : MET-pH08/64

NTC Probe

Model : HI7662

Sheath Material : Stainless

Diameter : 3.5 mm.

Length : 115 mm.

Serial No. : 09020C2N

ID No. : MET-pH08/64

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

Date of Received : 16 November 2023

Date of Calibration : 22 November 2023

Date of Issue : 22 November 2023

Calibrated by : [Redacted]

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

The temperature scale used was based on ITS-90

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

1. Platinum Resistance Thermometer (PRT)

ID No.	Cert. No.	Due Date	Traceability
400001	TT-0016-22	07 Feb 2024	National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No.	Cert. No.	Due Date	Traceability
400003	23E1866	01 Jun 2025	National Institute of Metrology Thailand (NIMT)
400004	23E1866	01 Jun 2025	National Institute of Metrology Thailand (NIMT)

Approved by : [Redacted]

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 66-400650-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
100	10.0040	10.0	0.0	0.11
100	30.0052	30.0	0.0	0.11
100	49.9966	50.0	0.0	0.11

Remark

UUC : Unit Under Calibration

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

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

- 000 -



Certificate of Calibration

Certificate No. : 66-400476-5

Page : 1 of 2

Submitted by : M E T Company Limited
36/659 Moo 6, T.Bangrakpattana, A.Bangbuatong, Nonthaburi 11110

Equipment : Air Chamber (Incubator)
Manufacturer : M-LAB Model : BIC-140
Range : N/A °C Resolution : 0.1 °C
Serial No. : 240412 ID No. : MET-BI01/55

Environment : On site calibration was carried out at the Laboratory, M E T Company Limited
Ambient Temperature : (31.0 to 32.0) °C
Relative Humidity : (55 to 60) %
Line Voltage : (210.0 to 210.8) V

Date of Received : 23 August 2023

Date of Calibration : 23 August 2023

Date of Issue : 23 August 2023

Calibrated by : [Redacted]

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

ID No.	Cert. No.	Due Date	Traceability
400029 & 400043	66-400226-1	27 Oct 2023	National Institute of Metrology Thailand (NIMT)

Approved by : [Redacted]

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 66-400476-5

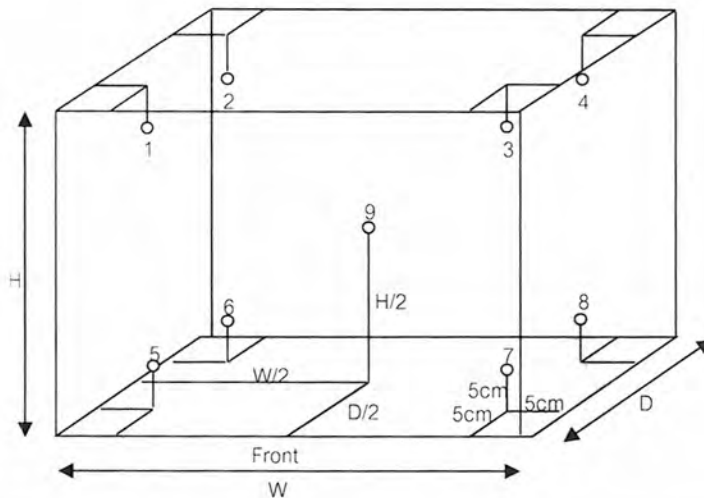
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.37 m

D = 0.33 m

H = 1.14 m

Capacity = 0.14 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
20.0	20.0	20.0	19.94	19.63	19.66	19.60	20.31	20.38	20.27	20.01	20.22	0.34

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
20.0	20.0	20.0	0.68	0.05	0.9

Remark The uncertainty is not combine uniformity of the air chamber

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

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

- o0o -



Certificate of Calibration

Certificate No. : 66-400476-3 **Page : 1 of 2**

Submitted by : M E T Company Limited
36/659 Moo 6, T.Bangrakpattana, A.Bangbuatong, Nonthaburi 11110

Equipment : Air Chamber (Refrigerator)
Manufacturer : Sanden Intercool Model : YPR-068S
Range : N/A °C Resolution : 1 °C
Serial No. : YPR0659S-141200060R ID No. : MET-RE03/59

Environment : On site calibration was carried out at the Laboratory, M E T Company Limited
Ambient Temperature : (29.5 to 30.5) °C
Relative Humidity : (54 to 57) %
Line Voltage : (220.5 to 221.8) V

Date of Received : 23 August 2023

Date of Calibration : 23 August 2023

Date of Issue : 23 August 2023

Calibrated by : [REDACTED]

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

ID No.	Cert. No.	Due Date	Traceability
400046 & 400028	66-400184-3	04 Oct 2023	National Institute of Metrology Thailand (NIMT)

Approved by : [REDACTED]

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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



Certificate of Calibration

Certificate No. : 66-400476-3

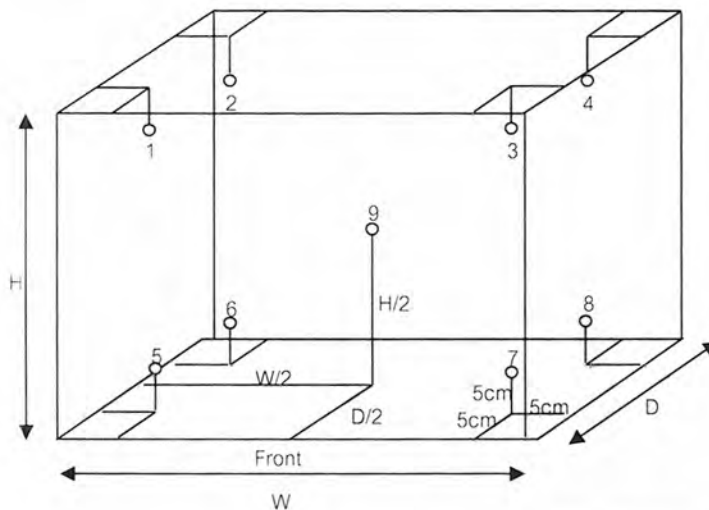
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.58 m

D = 0.60 m

H = 1.45 m

Capacity = 0.50 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
3	3	3	4.3	4.1	4.3	4.3	2.9	3.4	3.0	3.4	3.3	0.83

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
3	3	3	1.1	0.1	1.7

Remark The uncertainty is not combine uniformity of the air chamber

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

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

- o0o -



Certificate of Calibration

Certificate No. : 66-400476-2

Page : 1 of 2

Submitted by : M E T Company Limited
36/659 Moo 6, T.Bangrakpattana, A.Bangbuatong, Nonthaburi 11110

Equipment : Air Chamber (Oven)
Manufacturer : Binder Model : ED53
Range : N/A °C Resolution : 1 °C
Serial No. : 13-07419 ID No. : MET-OV02/57

Environment : On site calibration was carried out at the Laboratory, M E T Company Limited
Ambient Temperature : (31.0 to 32.0) °C
Relative Humidity : (55 to 60) %
Line Voltage : (210.0 to 210.8) V

Date of Received : 23 August 2023

Date of Calibration : 23 August 2023

Date of Issue : 23 August 2023

Calibrated by :

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

ID No.	Cert. No.	Due Date	Traceability
400029 & 400030	66-400227-1	24 Oct 2023	National Institute of Metrology Thailand (NIMT)

Approved by :

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 66-400476-2

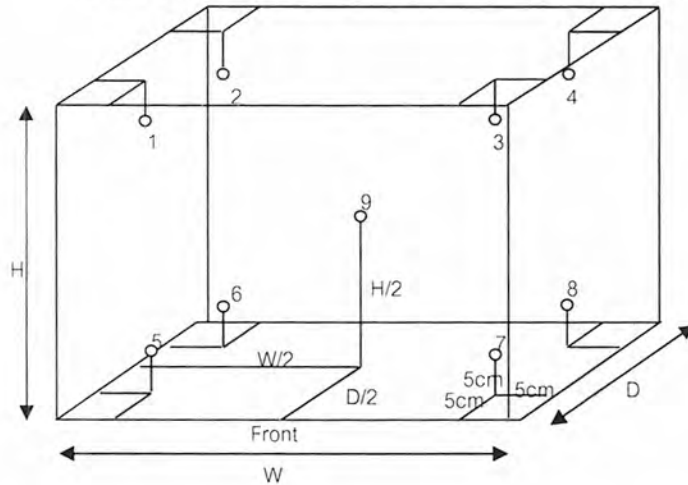
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.40 m

D = 0.33 m

H = 0.40 m

Capacity = 0.05 m³

Test Point (° C)	Setting Temperature (° C)	Indicating Temperature (° C)	Measured Temperature (° C) @ Sensor No.									Uncertainty (± ° C)
			1	2	3	4	5	6	7	8	9	
104	110	110	105.0	105.0	105.0	104.9	103.9	103.9	104.2	104.2	104.2	0.94
180	184	184	180.1	181.9	180.8	179.7	180.2	180.8	180.7	180.8	180.2	1.2

Test Point (° C)	Setting Temperature (° C)	Indicating Temperature (° C)	Measured Uniformity (° C)	Measured Stability (° C)	Overall Variation (° C)
104	110	110	1.0	0.2	1.3
180	184	184	1.9	0.3	2.7

Remark The uncertainty is not combine uniformity of the air chamber

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

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

- o0o -



Certificate of Calibration

Certificate No. : 66-400476-1

Page : 1 of 2

Submitted by : M E T Company Limited
36/659 Moo 6, T.Bangrakpattana, A.Bangbuatong, Nonthaburi 11110

Equipment : Air Chamber (Oven)
Manufacturer : Memmert Model : UM 100
Range : N/A °C Resolution : 0.1 °C
Serial No. : b197.0985 ID No. : MET-OV01/46

Environment : On site calibration was carried out at the Laboratory, M E T Company Limited
Ambient Temperature : (31.0 to 32.0) °C
Relative Humidity : (55 to 60) %
Line Voltage : (210.0 to 210.8) V

Date of Received : 23 August 2023

Date of Calibration : 23 August 2023

Date of Issue : 23 August 2023

Calibrated by : [REDACTED]

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

ID No.	Cert. No.	Due Date	Traceability
400029 & 400032	66-400228-1	25 Oct 2023	National Institute of Metrology Thailand (NIMT)

Approved by : [REDACTED]

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 66-400476-1

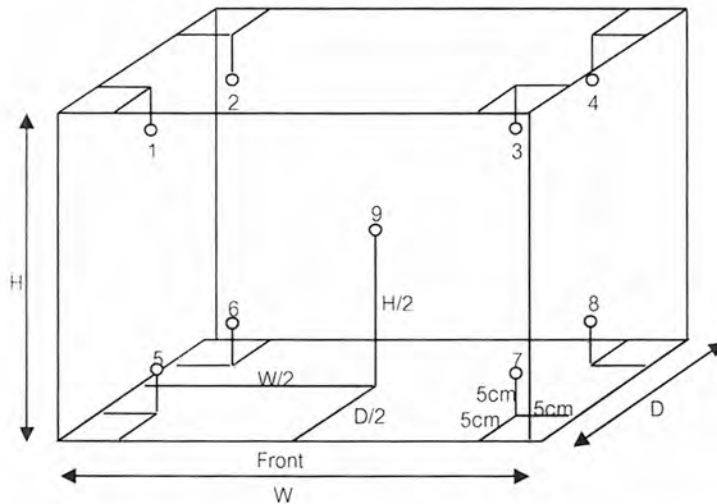
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.32 m

D = 0.18 m

H = 0.24 m

Capacity = 0.01 m³

Test Point (° C)	Setting Temperature (° C)	Indicating Temperature (° C)	Measured Temperature (° C) @ Sensor No.									Uncertainty (± ° C)
			1	2	3	4	5	6	7	8	9	
180.0	180.0	180.0	181.7	180.1	180.5	180.7	181.5	181.7	181.3	181.4	180.1	0.95

Test Point (° C)	Setting Temperature (° C)	Indicating Temperature (° C)	Measured Uniformity (° C)	Measured Stability (° C)	Overall Variation (° C)
180.0	180.0	180.0	1.7	0.2	2.0

Remark The uncertainty is not combine uniformity of the air chamber

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

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

- o0o -



Calibration Certificate

Cert. No. : CT-23-10-23746

Page : 1 of 4

Issued date : 18/10/2023

Equipment : COD Reactor , Manufacturer : MLAB , Model : DB1602
S/N = 0169 , Customer ID = -

Client : M E T COMPANY LIMITED.

36/659 M.6 Bang Rak Phatthana, Bang Bua Thong, Nonthaburi 11110

Received Date : 10 October 2023

Ref. Job No. : SO6610-00020

Calibrate by :

Cert. prepare by :

Calibrated Date : 10 October 2023

Approved by :

Calibration Place : Laboratory of Metrology Technical Co.,Ltd.

Environment Condition : Temperature 26.2 ± 0.8 (°c) , Humidity 65.5 ± 7.5 (%RH)

Calibration Method : Measure temperature distribution by 9 channel in flat level. , (MTEC WI No. # WICAL-02-005-R01)

Reference Standard Instrument :

No	Instrument	code	Model	Due date
1	Temperature Datalogger	MTEC-CE-0180	MLAB	10/2023
2	Thermo Hygrometer	MTEC-CE-0181	TP-50	06/2024

Condition of certificate :

(1) This certificate is traceable to International System of units (SI Units). , (2) This certificate was certified only for the instrument we calibrated. , (3) This result of calibration was found accurate as show on date and place of calibration only. , (4) The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k =$ (see result table) , providing a level of confidence of approximately 95%. , (5) This certificate may not be reproduced other than in full, except with the prior written approval of the head of Calibration Division, Metrology Technical Co.,Ltd.



Approved Signatory

CER04-R01-DF01

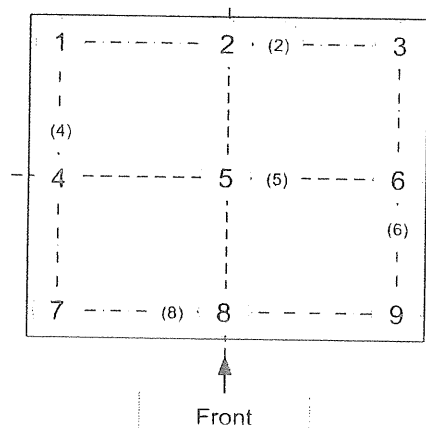
Certificate No. : CT-23-10-23746

Calibration Result :

Page : 2 of 4

Condition of UUC :

- 1) Without Adjustment
- 2) Immersion : 1/2 of the depth of the hole



- (1) The quoted uncertainty include with 'Stability'.
- (2) Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors , for at least half an hour after reaching stled state.
- (3) Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.
- (4) Overall variation = The difference of the maximum and the minimum measured temperature throughtout observation time.

Pic 1 : Position of each sensor No.

Section 1 : Report of Temperature distribution

Unit : (°c)

Calibration Point	UUC Setting ^(*)	UUC Reading ^(*)	Measured Temperature @ Sensor No.									Uncertainty (±)	k ^(**)
			#1	#2	#3	#4	#5	#6	#7	#8	#9		
150	150	150	150.54	149.65	150.55	150.08	150.75	151.00	149.50	150.35	149.95	0.637	2

(*) = The average of 30 values in each point , (**) = Coverage factor (k) value

Section 2 : Report of Chamber Performance

Unit : (°c)

Calibration Point	UUC Setting	UUC Reading ^(*)	Temperature Uniformity	Temperature Stability (± °c)	Temperature Overall Variation
150	150	150	1.11	0.05	1.61

(*) = The average of 30 values in each point

Approved Signatory :

Certificate No. : CT-23-10-23746

Page : 3 of 4

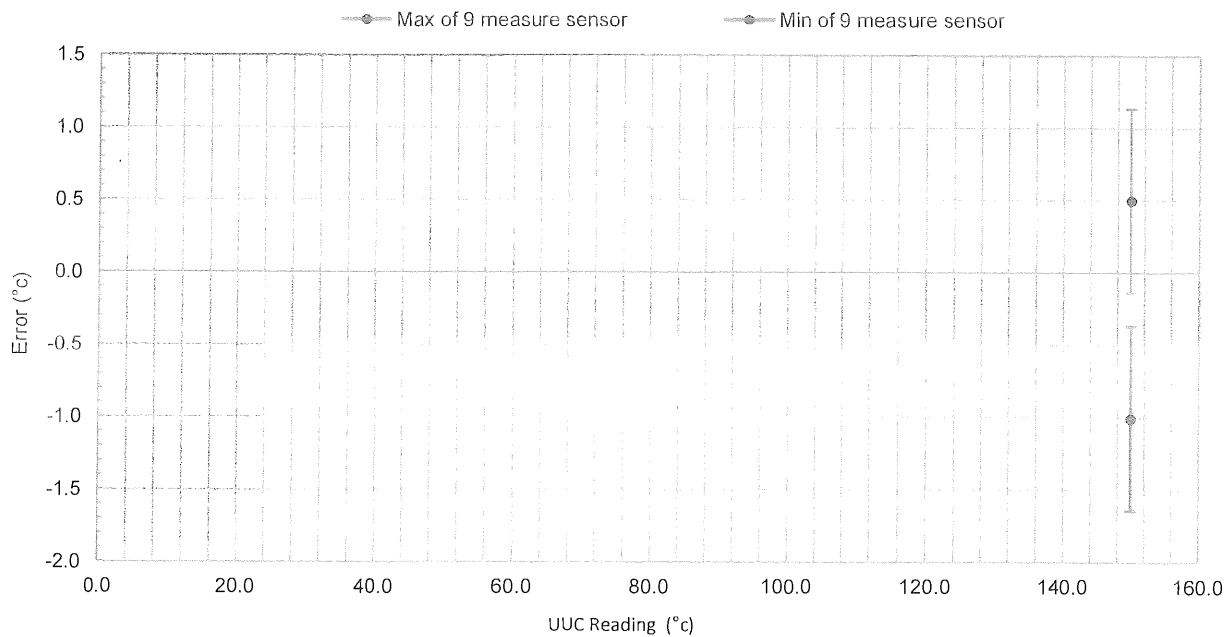
Section 3 : Possible of temperature. Show minimum and maximum of the average values and include with uncertainty of measurement. The average values is average of each position standard sensor throughout observation time.

Unit : (°C)

Calibration Point	UUC Setting (*)	UUC Reading (*)	Possible of Minimum temperature	Possible of Maximum temperature
150	150	150	148.86	151.64

(*) = The average of 30 values in each point

Section 4 : Trend of accuracy



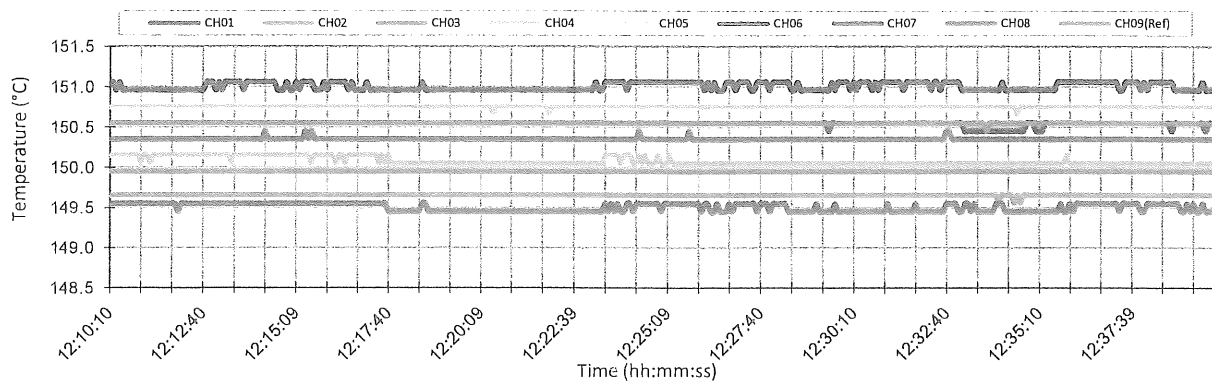
Approved Signatory :

Certificate No. : CT-23-10-23746

Page : 4 of 4

Section 5 : Graph report for Temperature distribution , not include uncertainty of measurement

(5.1) Temperature Distribution at UUC Reading 150 °C



Approved Signatory :

Certificate of Calibration

Certificate No. : 66-200271-1

Page : 1 of 2

Submitted by : M E T Company Limited
36/659 Moo 6, T.Bangrakpattana, A.Bangbuatong, Nonthaburi 11110

Equipment : Electronic Balance
Manufacturer : Sartorius Model : BSA224S-CW
Serial No. : 35090472 ID No. : MET-EB 02/60
Capacity : 220 g Resolution : 0.0001 g

Environment : On site calibration was carried out at the Laboratory, M E T Company Limited
Ambient Temperature : (25.0 to 25.6) °C
Relative Humidity : (52.3 to 55.6) %
Air Pressure : 1005.0 mbar

Date of Received : 23 August 2023

Date of Calibration : 23 August 2023

Date of Issue : 25 August 2023

Calibrated by :

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

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02222345	10 Nov 2023	National Institute of Metrology (Thailand), (NIMT)

Approved by :

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 66-200271-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

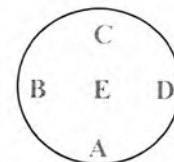
Nominal Value (g)	Correction (g)	Uncertainty $\pm$ (g)
0.05	0.0000	0.00011
0.1	0.0000	0.00011
0.5	0.0001	0.00011
1	0.0000	0.00011
5	0.0000	0.00011
10	0.0001	0.00012
50	0.0001	0.00014
100	0.0001	0.00020
150	0.0001	0.00038
200	0.0000	0.00038

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.11$, providing a level of confidence of approximately 95%

Eccentric error

Load test : 50 g
 A B C D E
 0.0001 0.0001 0.0001 0.0001 0.0000 g



Repeatability

Load test : 200 g
 Stdev. : 0.00005 g

- o0o -



Packing List

Unit : K-446 Kjeldigester standard



151111112791000281006111

Serial Number 1000281006

Page 1(1)

Item	Pieces	Description		
11059833	1.0000	Packing parts Kjeldigester K-446/K-449 Beipackteile K-446/K-449		✓ OK
037377	5.0000	Sample tubes 300 ml (set of 4) Probengläser 300 ml (Set à 4 Stück)		✓ OK
11059754	1.0000	Rack 20 cpl. Rack 20 kpl.		✓ OK
11058955	1.0000	Aspiration device Kjeldigester K-446/K-449 cpl. Absaugeinheit K-446/K-449		✓ OK
040444	1.0000	Weighing boat 20pcs. Wägeschiffchen 20 Stk.		✓ OK
010020	1.0000	Power cable type USA, 3 pole 120V Anschlusskabel USA W 120V		✓ OK
11058825	1.0000	Fume collection tube with ball joint Dampfsammelrohr mit Kugelschliff		✓ OK
11592548	1.0000	Kjeldahl Practice Guide en Kjeldahl Practice Guide en		✓ OK
11593546	1.0000	Operation Manual K-446/K-449 english Bedienungsanleitung K-446/K-449 englisch		✓ OK
11593635	1.0000	Supplementary sheet Kjeldigester K-446/K-449 Beiblatt K-446/K-449		✓ OK

Packed by





BUCHI Certificate Final Test Inspection

Unit : BÜCHI Kjeldigester K-446

Serial number 1000281006

Examination Procedure

1. **Visual control of the glass parts and the unit**

✓ OK

- No scratches on the coated surface
- Mounted in accordance to the specific drawing

2. **Security tests**

✓ OK

- High voltage test in accordance with EN 61010-1 (IEC 1010)
- Ground connection test in accordance with EN 61010-1 (IEC 1010)

3. **Functional tests**

Operating panel

✓ OK

- All buttons are working
- Cooling system is working after the instrument has been switched on

Connector plugs

✓ OK

- Scrubber connector is working

Heating element

✓ OK

- Heating-up temperature 420 °C is reached after 40 minutes
- Temperature calibration at 420 °C (3 measuring points)

4. **Completeness of order checked**

✓ OK

BÜCHI Labortechnik AG hereby declares that this unit is in accordance with the specifications



H.-P. Gohn, Quality Manager

Signature, Date:



Packing List

Unit : K-415 TripleScrub 230V



151111112781000281005111

Serial Number

1000281005

Page 1(1)

Item	Pieces	Description		
11057332	1.0000	Tray for adsorption storage Ablage für Adsorption		✓ OK
048355	1.0000	Silicone hose D6/9 L=3m Silikonschlauch D6/9 L=3.0m		✓ OK
033701	1.0000	Glass wool 30g Glaswolle 30g		✓ OK
028737	2.0000	Hose clamp Anschlussklemme		✓ OK
11064971	1.0000	Activated Charcoal 2-6mm, 150g Aktivkohle 2-6mm, 150g		✓ OK
010020	1.0000	Power cable type USA, 3 pole 120V Anschlusskabel USA W 120V		✓ OK
11593505	1.0000	Operation Manual K-415 english Bedienungsanleitung K-415 englisch		✓ OK

Packed by





BUCHI Certificate Final Test Inspection

Unit : BÜCHI Scrubber K-415

Serial number 1000281005

Examination Procedure

1. **Visual control of the glass parts and the unit**

✓ OK

- No scratches or splinters on the glass parts
- Mounted in accordance to the specific drawing

2. **Security tests**

✓ OK

- High voltage test in accordance with EN 61010-1 (IEC 1010)
- Ground connection test in accordance with EN 61010-1 (IEC 1010)

3. **Functional tests**

Vacuum test

✓ OK

- Bypass valve open: Pressure is 0 - 65 mbar below the atmospheric pressure
- Bypass valve closed: Pressure is 400 mbar (+/- 10 %) below the atmospheric pressure

4. **Completeness of order checked**

✓ OK

BÜCHI Labortechnik AG hereby declares that this unit is in accordance with the specifications

[Redacted Signature]

H.-P. Gohn, Quality Manager

Signature, Date:

[Redacted Date]



Packing List

Unit : K-360 Plastik Basic



151111113001000281014111

Serial Number

1000281014

Page 1(1)

Item	Pieces	Description		
043410	3.0000	Canister 10L thin-walled Kanister 10L dünnwandig		✓ OK
043603	1.0000	Packing parts K-360 Beipackteile K-360		✓ OK
047871	1.0000	Suppl. sheet distillation unit Beiblatt Distillation Unit		✓ OK
010020	1.0000	Power cable type USA, 3 pole 120V Anschlusskabel USA W 120V		✓ OK
11592548	1.0000	Kjeldahl Practice Guide en Kjeldahl Practice Guide en		✓ OK
093176	1.0000	Operation Manual K-360 english Bedienungsanleitung K-360 englisch		✓ OK

Packed by





BUCHI Certificate Final Test Inspection

Unit : BÜCHI BÜCHI Kjelflex K-360

Serial number 1000281014

Examination Procedure

1. **Visual control of the glass parts and the unit**

✓ OK

- No scratches on the coated surface or splinters on the glass parts
- Mounted in accordance to the specific drawing

2. **Security tests**

✓ OK

- High voltage test in accordance with EN 61010-1:2002 (IEC 61010-1, VDE 0411)
- Ground connection test in accordance with EN 61010-1:2002 (IEC 61010-1, VDE 0411)
- Safety door sensor checked

3. **Functional tests**

✓ OK

Electronics

- Electronic modul is tested with the checking device PG157
- Connector plugs are working

Operating panel

✓ OK

- Display is working
- All buttons of the keypad are working

Pump testing

✓ OK

- All pumps are working
- All pumps (exception: water pump of the steam generator) are precalibrated

Valve testing

✓ OK

- All valves are working

Steam generator testing

✓ OK

- The steam generator is filled with water
- The steam generator valve is working
- The amount of distillate corresponds to specifications

Further testing

✓ OK

- Beeper is working

4. **Unit configuration and completeness of order checked**

✓ OK

BÜCHI Labortechnik AG hereby declares that this unit is in accordance with the specifications



H.-P. Gohn, Quality Manager

Signature, Date:



Certificate of Calibration

Certificate No. : 67-200064-1

Page : 1 of 2

Submitted by : M E T Company Limited
36/659 Moo 6, T. Bangrakpattana, A. Bangbuatong, Nonthaburi 11110

Equipment : Electronic Balance
Manufacturer : METTLER TOLEDO Model : AG285
Serial No. : 1122140126 ID No. : MET-EB01/46
Capacity : 210 g Resolution : 0.00001g/81g, 0.0001g/210g

Environment : On site calibration was carried out at the Laboratory, M E T Company Limited
Ambient Temperature : (25.5 to 25.8) °C
Relative Humidity : (59.8 to 60.7) %
Air Pressure : 1012.0 mbar

Date of Received : 22 February 2024

Date of Calibration : 22 February 2024

Date of Issue : 23 February 2024

Calibrated by : [Redacted]

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

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02232088	08 Nov 2024	National Institute of Metrology (Thailand), (NIMT)

Approved by :

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-200064-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty $\pm$ (g)
0.01	0.00001	0.000016
0.1	0.00001	0.000016
1	0.00000	0.000026
5	-0.00002	0.000043
10	-0.00002	0.000053
20	-0.00023	0.000071
50	-0.00029	0.00011
100	-0.0001	0.00021
150	-0.0004	0.00038
200	-0.0008	0.00038

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.23$, providing a level of confidence of approximately 95%

Eccentric error

Load test : 50 g

A B C D E

0.00043 0.00018 -0.00024 -0.00015 0.00000 g



Repeatability

Load test : 200 g

Stdev. : 0.000074 g

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National Institute of Metrology (Thailand)

Certificate of Calibration



Certificate No. : AA-2022-23
Issued by : Acoustics Laboratory
Acoustics and Vibration Group

Page 1 of 5 pages

MEASUREMENT ITEM : Sound Calibrator
MANUFACTURER : RION
MODEL/TYPE : NC-75
SERIAL NUMBER : 34480442
CUSTOMER : MET Co., Ltd.
36/659 Moo 6, T. Bangrakphatthana,
A. Bangbuathong, Nonthaburi 11110
MEASUREMENT DATE : 25 August 2023

The reported measurement result relates only to the measurand and applies only at the time of measurement.

*The calibration results only marked with an asterisk * in this certificate are not included in the scope of accreditation.*

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. This calibration certificate may not be reproduced other than in full except with the permission of the Director of National Institute of Metrology (Thailand).

Reference	Date	Authorized Signatory	Person in charge
AUVC132-01/23	25 August 2023		

This certificate is consistent with the capabilities that are included in Appendix C of the MRA drawn up by the CIPM. Under the MRA, all participating institutes recognize the validity of each other's calibration and measurement certificates for the quantities, ranges and measurement uncertainties specified in Appendix C (for details see <http://www.bipm.org>).

National Institute of Metrology (Thailand)

Ministry of Higher Education, Science, Research and Innovation

3/4-5 Moo 3, Klong 5, Klong Luang, Pathumthani 12120, Thailand. Tel: (66) 2577 5100, Fax: (66) 2577 3659

75/7 Rama VI Road, Rachathewi, Bangkok 10400, Thailand. Tel: (66) 2354 3700, Fax: (66) 2354 3692



UNCERTAINTY OF MEASUREMENT

The stated uncertainty is the expanded uncertainty obtained by multiplying the standard uncertainty by the coverage factor $k=2$. It has been determined in accordance with EA publication EA-4/02 M:2013 "Evaluation of the Uncertainty of Measurement in Calibration" and JCGM 100:2008 "Evaluation of measurement data --Guide to the Expression of Uncertainty in Measurement (GUM 1995 with minor corrections)". The value of the measured lies within the assigned range of value with a probability of 95 %.

Parameter	Uncertainty at SPL94 dB	Maximum-permitted uncertainty of measurement for a coverage probability of 95%	Unit
1.Sound Pressure level	0.08	0.15	dB
2. Frequency	0.1	0.2	%
3. THD+N	0.1	0.5	%

TRACEABILITY

This certificate provides traceability of measurement to recognized national standards, and to the realization of the International System of Units (SI).



ENVIRONMENTAL CONDITIONS

Ambient condition in the laboratory are as follows :

Temperature	:	(23.0 ± 1.0)	°C
Pressure	:	(101.325 ± 1.500)	kPa
Relative Humidity	:	(50.0 ± 15.0)	%

Reference Condition : 101.325 kPa , 23.0 °C and 50.0 %RH.

Calibration Condition

Preconditionings : 16 hours at ambient conditions.

Measurement Conditions : The average values during measurement are
 (100.343 ± 0.036) kPa, (22.0 ± 0.3) °C and (53.0 ± 2.0) %RH

MEASUREMENT METHOD

The sound pressure level, frequency and total distortion of the sound calibrator was measured using the reference microphone. The insert voltage technique was employed and the measurement procedure was based on IEC 60942: 2017.

Reference Microphone

4180 serial no.1395446

TABULATION OF RESULTS

The following tables give the calibration results and associated measurement uncertainties at 95% of confidence level. The calibration results of sound pressure level which quoted in dB with reference to 20 µPa are corrected to the values under the reference environmental conditions.

The calibration results exclude the calibrator pressure correction but include the microphone volume correction, which was obtained from the manufacturer instruction manual of the sound calibrator, at the level of 0 dB.

MEASUREMENT RESULTS

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value ^[1] (dB)	Acceptance Limit ^[2] (dB)
Microphone 4180 Serial No.1395446			
94	94.15	0.15	± 0.25

Note ^[1] : The deviated value is the absolute value of the difference between the measured value and the corresponding specified sound pressure level.

Note ^[2] : The acceptance limit is obtained from IEC 60942: 2017.

2. Frequency*

Specified Frequency (Hz)	Measured value (Hz)	Deviated value ^[3] (%)	Acceptance Limit ^[4] (%)
At the sound pressure level of 94 dB			
1000	1000.0	0.0	± 0.7

Note ^[3] : The deviated value is the absolute value of the difference in percent between the measured value and the corresponding specified frequency.

Note ^[4] : The acceptance limit is obtained from IEC 60942: 2017.



3. Total distortion + Noise*

Microphone 4180 Serial No.1395446

Measured value ^[5] (%)	Maximum total distortion + Noise ^[6] (%)
At the sound pressure level of 94 dB	
0.2	2.5

Note ^[5] : The measured value is the total distortion, measured over the frequency range from 20 Hz to 20 kHz.

Note ^[6] : The maximum total distortion + noise is obtained from IEC 60942: 2017.

End of Certificate of Calibration

NIMT



Certificate of Calibration

Certificate Number : SPR24010268-9

Customer : MET CO.,LTD.

36/659 Moo. 6 Tambol Bangragpattana, Amphur Bangbuatong,
Nonthaburi 11110

Equipment Name : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial Number : 222064

ID. Number : SLM-50

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$

Received Date : 18 Jan 2024

Relative Humidity : 50 % $\pm$ 15 %

Calibration Date : 22 Jan 2024

Location of Calibration : In-Lab

Recommend Due Date : 22 Jan 2025

Calibration Procedure : SP-CPE-04-01

Date of Issue : 23 Jan 2024

Method of Calibration

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

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

Calibrated by :

Calibration Officer

Approved by :

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24010268-9

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 114/0166	17 Feb 2024

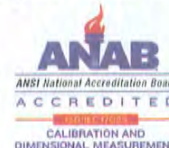
Traceability

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

TISTR - Thailand Institute of Scientific and Technological Research



ID LINE : IEC17025



Result of Calibration

Certificate No. : SPR24010268-9

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.1	114.1	0.1	0.1	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Note :

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

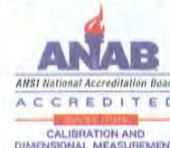
Measurement Uncertainty

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

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24010268-3

Page : 1 of 3

Customer : MET CO.,LTD.

36/659 Moo. 6 Tambol Bangragpattana, Amphur Bangbuatong,
Nonthaburi 11110

Equipment Name : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial Number : 222067

ID. Number : SLM-24

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$

Received Date : 18 Jan 2024

Relative Humidity : 50 % $\pm$ 15 %

Calibration Date : 22 Jan 2024

Location of Calibration : In-Lab

Recommend Due Date : 22 Jan 2025

Calibration Procedure : SP-CPE-04-01

Date of Issue : 23 Jan 2024

Method of Calibration

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

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

Calibrated by :

Calibration Officer

Approved by :

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24010268-3

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 114/0166	17 Feb 2024

Traceability

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

TISTR - Thailand Institute of Scientific and Technological Research



ID LINE : IEC17025



Result of Calibration

Certificate No. : SPR24010268-3

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.1	93.1	-0.9	-0.9	0.15
114	113.0	113.0	-1.0	-1.0	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.3	93.3	-0.7	-0.7	0.15
114	113.2	113.2	-0.8	-0.8	0.15

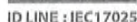
Note :

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

Measurement Uncertainty

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

- End of Certificate -



Certificate of Calibration

Certificate Number : SPR24010268-8

Page : 1 of 3

Customer : MET CO.,LTD.

36/659 Moo. 6 Tambol Bangragpattana, Amphur Bangbuatong,
Nonthaburi 11110

Equipment Name : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial Number : 222068

ID. Number : SLM-49

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$

Received Date : 18 Jan 2024

Relative Humidity : 50 % $\pm$ 15 %

Calibration Date : 22 Jan 2024

Location of Calibration : In-Lab

Recommend Due Date : 22 Jan 2025

Calibration Procedure : SP-CPE-04-01

Date of Issue : 23 Jan 2024

Method of Calibration

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

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

Calibrated by :

Calibration Officer

Approved by :

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24010268-8

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 114/0166	17 Feb 2024

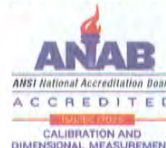
Traceability

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

TISTR - Thailand Institute of Scientific and Technological Research



ID LINE : IEC17025



Result of Calibration

Certificate No. : SPR24010268-8

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Select C

Unit : dB

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

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 -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24010268-5

Page : 1 of 3

Customer : MET CO.,LTD.

36/659 Moo. 6 Tambol Bangragpattana, Amphur Bangbuatong,
Nonthaburi 11110

Equipment Name : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial Number : 222069

ID. Number : SLM-29

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$

Received Date : 18 Jan 2024

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

Calibration Date : 22 Jan 2024

Location of Calibration : In-Lab

Recommend Due Date : 22 Jan 2025

Calibration Procedure : SP-CPE-04-01

Date of Issue : 23 Jan 2024

Method of Calibration

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

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

Calibrated by :



Calibration Officer

Approved by :



Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24010268-5

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 114/0166	17 Feb 2024

Traceability

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

TISTR - Thailand Institute of Scientific and Technological Research



ID LINE : IEC17025



Result of Calibration

Certificate No. : SPR24010268-5

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Note :

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

Measurement Uncertainty

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

- End of Certificate -



Certificate of Calibration

Certificate Number : SPR24010268-9

Page : 1 of 3

Customer : MET CO.,LTD.

36/659 Moo. 6 Tambol Bangragpattana, Amphur Bangbuatong,
Nonthaburi 11110

Equipment Name : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial Number : 222064

ID. Number : SLM-50

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$

Received Date : 18 Jan 2024

Relative Humidity : 50 % $\pm$ 15 %

Calibration Date : 22 Jan 2024

Location of Calibration : In-Lab

Recommend Due Date : 22 Jan 2025

Calibration Procedure : SP-CPE-04-01

Date of Issue : 23 Jan 2024

Method of Calibration

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

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

Calibrated by :

Calibration Officer

Approved by :

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24010268-9

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 114/0166	17 Feb 2024

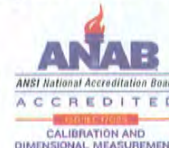
Traceability

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

TISTR - Thailand Institute of Scientific and Technological Research



ID LINE : IEC17025



Result of Calibration

Certificate No. : SPR24010268-9

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.1	114.1	0.1	0.1	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Note :

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

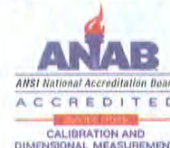
Measurement Uncertainty

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

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24010268-3

Page : 1 of 3

Customer : MET CO.,LTD.

36/659 Moo. 6 Tambol Bangragpattana, Amphur Bangbuatong,
Nonthaburi 11110

Equipment Name : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial Number : 222067

ID. Number : SLM-24

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$

Received Date : 18 Jan 2024

Relative Humidity : 50 % $\pm$ 15 %

Calibration Date : 22 Jan 2024

Location of Calibration : In-Lab

Recommend Due Date : 22 Jan 2025

Calibration Procedure : SP-CPE-04-01

Date of Issue : 23 Jan 2024

Method of Calibration

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

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

Calibrated by :

Calibration Officer

Approved by :

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24010268-3

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 114/0166	17 Feb 2024

Traceability

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

TISTR - Thailand Institute of Scientific and Technological Research



ID LINE : IEC17025



Result of Calibration

Certificate No. : SPR24010268-3

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.1	93.1	-0.9	-0.9	0.15
114	113.0	113.0	-1.0	-1.0	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.3	93.3	-0.7	-0.7	0.15
114	113.2	113.2	-0.8	-0.8	0.15

Note :

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

Measurement Uncertainty

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

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24010268-8

Page : 1 of 3

Customer : MET CO.,LTD.

36/659 Moo. 6 Tambol Bangragpattana, Amphur Bangbuatong,
Nonthaburi 11110

Equipment Name : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial Number : 222068

ID. Number : SLM-49

Environmental Conditions

Ambient Temperature : 23 °C $\pm$ 3 °C

Received Date : 18 Jan 2024

Relative Humidity : 50 % $\pm$ 15 %

Calibration Date : 22 Jan 2024

Location of Calibration : In-Lab

Recommend Due Date : 22 Jan 2025

Calibration Procedure : SP-CPE-04-01

Date of Issue : 23 Jan 2024

Method of Calibration

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

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

Calibrated by :



Calibration Officer

Approved by :



Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24010268-8

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 114/0166	17 Feb 2024

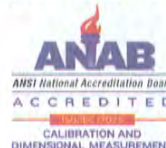
Traceability

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

TISTR - Thailand Institute of Scientific and Technological Research



ID LINE : IEC17025



Result of Calibration

Certificate No. : SPR24010268-8

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Select C

Unit : dB

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

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 -



Certificate of Calibration

Certificate Number : SPR24010268-5

Page : 1 of 3

Customer : MET CO.,LTD.

36/659 Moo. 6 Tambol Bangragpattana, Amphur Bangbuatong,
Nonthaburi 11110

Equipment Name : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial Number : 222069

ID. Number : SLM-29

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$

Received Date : 18 Jan 2024

Relative Humidity : 50 % $\pm$ 15 %

Calibration Date : 22 Jan 2024

Location of Calibration : In-Lab

Recommend Due Date : 22 Jan 2025

Calibration Procedure : SP-CPE-04-01

Date of Issue : 23 Jan 2024

Method of Calibration

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

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

Calibrated by :

Calibration Officer

Approved by :

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24010268-5

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 114/0166	17 Feb 2024

Traceability

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

TISTR - Thailand Institute of Scientific and Technological Research



ID LINE : IEC17025



Result of Calibration

Certificate No. : SPR24010268-5

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Note :

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

Measurement Uncertainty

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

- End of Certificate -



Certificate of Calibration

Certificate Number : SPR24010268-4

Page : 1 of 3

Customer : MET CO.,LTD.

36/659 Moo. 6 Tambol Bangragpattana, Amphur Bangbuatong,
Nonthaburi 11110

Equipment Name : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial Number : 222070

ID. Number : SLM-28

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$

Received Date : 18 Jan 2024

Relative Humidity : 50 % $\pm$ 15 %

Calibration Date : 22 Jan 2024

Location of Calibration : In-Lab

Recommend Due Date : 22 Jan 2025

Calibration Procedure : SP-CPE-04-01

Date of Issue : 23 Jan 2024

Method of Calibration

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

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

Calibrated by :

Calibration Officer

Approved by :

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24010268-4

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 114/0166	17 Feb 2024

Traceability

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

TISTR - Thailand Institute of Scientific and Technological Research



ID LINE : IEC17025



Result of Calibration

Certificate No. : SPR24010268-4

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.2	93.2	-0.8	-0.8	0.15
114	113.2	113.2	-0.8	-0.8	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.4	93.4	-0.6	-0.6	0.15
114	113.3	113.3	-0.7	-0.7	0.15

Note :

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

Measurement Uncertainty

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

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24020112-10

Page : 1 of 3

Customer : MET CO.,LTD.

36/659 Moo. 6 Tambol Bangragpattana, Amphur Bangbuatong,
Nonthaburi 11110

Equipment Name : Noise Dose Meter

Manufacturer : Tenmars

Model : ST-130

Serial Number : 220100177

ID. Number : ND-35

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$

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

Location of Calibration : In-Lab

Calibration Procedure : SP-CPE-04-01

Received Date : 08 Feb 2024

Calibration Date : 10 Feb 2024

Recommend Due Date : 10 Feb 2025

Date of Issue : 11 Feb 2024

Method of Calibration

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

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

Calibrated by :



Calibration Officer

Approved by :



Authorized Signatory



Page : 2 of 3

SP-FM-04-15 rev.0



ID LINE : IEC17025



Result of Calibration

Certificate Number : SPR24020112-10

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Note :

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

Measurement Uncertainty

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

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24020112-3

Page : 1 of 3

Customer : MET CO.,LTD.

36/659 Moo. 6 Tambol Bangragpattana, Amphur Bangbuatong,
Nonthaburi 11110

Equipment Name : Noise Dose Meter

Manufacturer : Tenmars

Model : ST-130

Serial Number : 220100178

ID. Number : ND-14

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$

Received Date : 08 Feb 2024

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

Calibration Date : 10 Feb 2024

Location of Calibration : In-Lab

Recommend Due Date : 10 Feb 2025

Calibration Procedure : SP-CPE-04-01

Date of Issue : 11 Feb 2024

Method of Calibration

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

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

Calibrated by :



Calibration Officer

Approved by :



Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24020112-3

Page : 2 of 3

Reference Standards

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

Traceability

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

TISTR - Thailand Institute of Scientific and Technological Research



ID LINE : IEC17025



Result of Calibration

Certificate Number : SPR24020112-3

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Note :

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

Measurement Uncertainty

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

- End of Certificate -



ID LINE : IEC17025

Certificate of Calibration

Certificate Number : SPR24020112-4

Page : 1 of 3

Customer : MET CO.,LTD.

36/659 Moo. 6 Tambol Bangragpattana, Amphur Bangbuatong,
Nonthaburi 11110

Equipment Name : Noise Dose Meter

Manufacturer : Tenmars

Model : ST-130

Serial Number : 220100181

ID. Number : ND-15

Environmental Conditions

Ambient Temperature : 23 °C $\pm$ 3 °C

Received Date : 08 Feb 2024

Relative Humidity : 50 % $\pm$ 15 %

Calibration Date : 10 Feb 2024

Location of Calibration : In-Lab

Recommend Due Date : 10 Feb 2025

Calibration Procedure : SP-CPE-04-01

Date of Issue : 11 Feb 2024

Method of Calibration

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

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

Calibrated by :

Calibration Officer

Approved by :

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24020112-4

Page : 2 of 3

Reference Standards

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

Traceability

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

TISTR - Thailand Institute of Scientific and Technological Research



ID LINE : IEC17025



Result of Calibration

Certificate Number : SPR24020112-4

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Note :

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

Measurement Uncertainty

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

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24020112-2

Page : 1 of 3

Customer : MET CO.,LTD.

36/659 Moo. 6 Tambol Bangragpattana, Amphur Bangbuatong,
Nonthaburi 11110

Equipment Name : Noise Dose Meter

Manufacturer : Tenmars

Model : ST-130

Serial Number : 220100183

ID. Number : ND-11

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$

Received Date : 08 Feb 2024

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

Calibration Date : 10 Feb 2024

Location of Calibration : In-Lab

Recommend Due Date : 10 Feb 2025

Calibration Procedure : SP-CPE-04-01

Date of Issue : 11 Feb 2024

Method of Calibration

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

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

Calibrated by :



Calibration Officer

Approved by :



Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24020112-2

Page : 2 of 3

Reference Standards

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

Traceability

This certification is traceable to the International System of Unit maintained at :
TISTR - Thailand Institute of Scientific and Technological Research



ID LINE : IEC17025



Result of Calibration

Certificate Number : SPR24020112-2

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Note :

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

Measurement Uncertainty

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

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24020112-5

Page : 1 of 3

Customer : MET CO.,LTD.

36/659 Moo. 6 Tambol Bangragpattana, Amphur Bangbuatong,
Nonthaburi 11110

Equipment Name : Noise Dose Meter

Manufacturer : Tenmars

Model : ST-130

Serial Number : 220100184

ID. Number : ND-17

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$

Received Date : 08 Feb 2024

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

Calibration Date : 10 Feb 2024

Location of Calibration : In-Lab

Recommend Due Date : 10 Feb 2025

Calibration Procedure : SP-CPE-04-01

Date of Issue : 11 Feb 2024

Method of Calibration

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

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

Calibrated by :



Calibration Officer

Approved by :



Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24020112-5

Page : 2 of 3

Reference Standards

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

Traceability

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

TISTR - Thailand Institute of Scientific and Technological Research



ID LINE : IEC17025



Result of Calibration

Certificate Number : SPR24020112-5

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Note :

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

Measurement Uncertainty

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

- End of Certificate -

Instrument information

JANTYTECH
建通科技

Name	WET BULB GLOBE TEMPERATURE (WBGT)METER
Series No	3522210130
Type	JT2011-E2A
Customer	MET CO., LTD.
Address	36/659 Moo. 6, Bangrak Phatthana, Bang Bua Thong, Nonthaburi 11110

Integrity check of instrument

Appearance	✓
Parts integrity	✓
Screen display or touch	✓
Instrument button	✓
Power supply	✓
battery	✓
Data storage and export	✓
Deviation degree of comparison test with standard instrument	✓

Calibration Results

UUC Sensor	Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (±°C)
WET	25.0	25.2	-0.2	0.2
	30.0	29.9	0.1	0.2
	35.0	35.1	-0.1	0.2
	40.0	39.8	0.2	0.2
	45.0	44.9	0.1	0.2
DRY	25.0	24.8	0.2	0.2
	30.0	30.2	-0.2	0.2
	35.0	35.2	-0.2	0.2
	40.0	39.8	0.2	0.2
	45.0	44.9	0.1	0.2
GLOBE	25.0	24.8	0.2	0.2
	30.0	29.9	0.1	0.2
	35.0	34.8	0.2	0.2
	40.0	39.8	0.2	0.2
	45.0	44.9	0.1	0.2

Environmental conditions: temperature: 26 °C±2°C, relative humidity: 30% RH±10RH%

Reference Standard : Standard Mercury Thermometers, Manufacturer: BGRI, Model: STA, SN : 2-56,
Calibrated Date : 20 February 2023, Calibration Certificate No. : RA21H-AB1000009

This Certificate is traceable to NCMT North China, Certificate No.: RA20J-AK000073

Calibration Engineer : 

Date : February 22, 2024

质检专用章

Instrument information

JANTYTECH
建通科技

Name	WET BULB GLOBE TEMPERATURE (WBGT)METER
Series No	3522210131
Type	JT2011-E2A
Customer	MET CO., LTD.
Address	36/659 Moo. 6, Bangrak Phatthana, Bang Bua Thong, Nonthaburi 11110

Integrity check of instrument

Appearance	✓
Parts integrity	✓
Screen display or touch	✓
Instrument button	✓
Power supply	✓
battery	✓
Data storage and export	✓
Deviation degree of comparison test with standard instrument	✓

Calibration Results

UUC Sensor	Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (±°C)
WET	25.0	25.2	-0.2	0.2
	30.0	30.2	-0.2	0.2
	35.0	34.8	0.2	0.2
	40.0	40.1	0.1	0.2
	45.0	44.9	0.1	0.2
DRY	25.0	24.8	0.2	0.2
	30.0	30.2	-0.2	0.2
	35.0	35.2	-0.2	0.2
	40.0	40.2	-0.2	0.2
	45.0	45.2	-0.2	0.2
GLOBE	25.0	24.8	0.2	0.2
	30.0	29.9	0.1	0.2
	35.0	35.1	-0.1	0.2
	40.0	39.9	0.1	0.2
	45.0	44.9	0.1	0.2

Environmental conditions: temperature: 26 °C±2°C, relative humidity: 30% RH±10RH%

Reference Standard : Standard Mercury Thermometers, Manufacturer: BGRI, Model: STA, SN : 2-56,
Calibrated Date : 20 February 2023, Calibration Certificate No. : RA21H-AB1000009

This Certificate is traceable to NCMT North China, Certificate No.: RA20J-AK000073

Calibration Engineer : 

Date : February 22, 2024

质检专用章

Instrument information

JANTYTECH
建通科技

Name	WET BULB GLOBE TEMPERATURE (WBGT)METER
Series No	3522210132
Type	JT2011-E2A
Customer	MET CO., LTD.
Address	36/659 Moo. 6, Bangrak Phatthana, Bang Bua Thong, Nonthaburi 11110

Integrity check of instrument

Appearance	✓
Parts integrity	✓
Screen display or touch	✓
Instrument button	✓
Power supply	✓
battery	✓
Data storage and export	✓
Deviation degree of comparison test with standard instrument	✓

Calibration Results

UUC Sensor	Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (±°C)
WET	25.0	24.9	0.1	0.2
	30.0	29.9	0.1	0.2
	35.0	35.1	-0.1	0.2
	40.0	40.1	-0.1	0.2
	45.0	45.2	-0.2	0.2
DRY	25.0	25.1	-0.1	0.2
	30.0	30.1	-0.1	0.2
	35.0	34.8	0.2	0.2
	40.0	40.1	-0.1	0.2
	45.0	44.9	0.1	0.2
GLOBE	25.0	24.9	0.1	0.2
	30.0	29.9	0.1	0.2
	35.0	34.8	0.2	0.2
	40.0	40.1	-0.1	0.2
	45.0	45.2	-0.2	0.2

Environmental conditions: temperature: 26 °C±2°C, relative humidity: 30% RH±10RH%

Reference Standard : Standard Mercury Thermometers, Manufacturer: BGRI, Model: STA, SN : 2-56,
Calibrated Date : 20 February 2023, Calibration Certificate No. : RA21H-AB1000009

This Certificate is traceable to NCMT North China, Certificate No.: RA20J-AK000073

Calibration Engineer : 

Date : February 22, 2024

质检专用章



GIIC Calibration Laboratory

700/20-21 Phaholyothin Rd., Samsennai, Phayathai,
Bangkok 10400 Thailand

Tel : +66 (02) 615 4999

Fax : +66 (02) 615 4644

E-mail : cal@giic.co.th



CERTIFICATE No.: CAL00039-24

PAGE : 1

OF : 3

Certificate of Calibration

Equipment : DIGITAL LIGHT METER

Manufacturer : DIGICON

Model / Type : LX-73

Serial No. : T.018388

ID No. : -

Customer : M E T CO., LTD.

36/659 Moo 6 T.Bangrakpattana A.Bangbuathong Nonthaburi

11110.

C.S.R. No. : L0000015-24

Received Date : 03 January 2024

Calibration Date : 10 January 2024

Calibrated By :

Approved By :

Issue Date :

10 January 2024

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

This certificate may not be reproduced except in full unless permission for the reproduction has been obtained in writing from the laboratory.

CERTIFICATE No.: CAL00039-24

PAGE: 2

OF: 3

CALIBRATION REPORT

Condition of this calibration result :

1. Environment : Temperature : $(23 \pm 3) ^\circ\text{C}$
 Relative Humidity : $(50 \pm 15) \%$

2. Reference / Procedure Used :

- This Instrument was calibrated by substitution with reference illuminance meter, the Instrument and reference illuminance meter were mounted with the plane of its diffuser vertical and normal to the direction of measurement Calibration was illuminated by the luminous standard lamp (operated at colour temperature 2856K) according to GIIC Calibration Laboratory calibration procedure No.GIICLAB-CP-L01.

3. Reference Standard Instrument :

Instrument	Model	Serial No	Certificate No	Due Dated
Illuminance meter	PMA2200 / PMA2130	25531 / 025000	TP-1021-23	8 Jun 24

4. This Certification is traceable to the SI unit through :

- The National Institute of Metrology (Thailand) .

5. Uncertainty :

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

CALIBRATION REPORT

All data shown below were as received value : Without adjustment

Calibration result :

Function: Illuminance Measurement

¹ UUC Range (lux)	Standard Setting (lux)	¹ UUC Reading (lux)	Error (lux)	Uncertainty of measurement ± (lux)
400	0	0.0	0.0	0.60
	50	51.2	1.2	1.6
	250	254.8	4.8	6.5
4000	500	515	15	13
	1000	1026	26	26
	1500	1527	27	36
	2000	2045	45	48
	3000	3068	68	72
40000	4000	4080	80	96
	5000	5100	100	0.12 klux

¹UUC = Unit Under Calibration

This result of calibration was found accurated as show on data and place of calibration for the calibrated item only.

- END -