

A collection of various tropical leaves, including a large Monstera leaf with prominent splits and several palm fronds, arranged in the top-left corner of the page.

เอกสารสอบเทียบเครื่องมือ

A single, small, pointed green leaf located on the right edge of the page.



บริษัท เอ็นวีแล็บ จำกัด 540,540/1 ซอยบางแค 7 แขวงบางแค เขตบางแค กรุงเทพมหานคร 10160
EnviLab Co., Ltd. 540,540/1 Soi Bangkhae 7 Bangkhae Bangkok Bangkok 10160
Tel : 02-802-3577-8 Fax: 02-802-3773 E-mail : info@evltesting.com



Printed & Signed by: [Signature]

TSP High Volume Sampler Calibration

Verification Report No.

SO2300039-E001 -TSP 02

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: วัดคลองสินบล	
UTM: 47Q N 1806693 E 564840	
Sampler: ETSP#39	
Recorder: ECRANG15315224	
Date: 22 Feb 23	
Technical: [Redacted]	
Approval: [Redacted]	

CONDITIONS

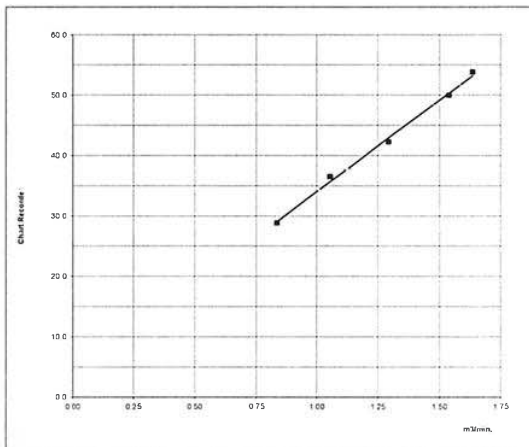
Barometric Press. (hPa): 951.0	Corrected Pressure (mm Hg): 713.3
Temperature (deg C): 30.0	Temperature (deg K): 303.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Qstd Slope: 2.03736
Model: TE-5025A	Qstd Intercept: -0.03733
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION Slope = 30.5848 Intercept = -0.8665 Corr. coeff. = 0.9980 # of Observations: 5 Range of Chart at 1.1 - 1.7 m3/min: 35 53
1	12.22	1.667	52.0	49.96	
2	9.14	1.444	46.0	44.20	
3	7.47	1.307	40.0	38.43	
4	4.77	1.048	32.0	30.74	
5	2.98	0.832	26.0	24.98	



Calibrated by :

22 February 2023

Approved by :

22 February 2023

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FE-MNT-29 Rev.00/01/08/13



EnviLab Co., Ltd.

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ผู้จัดการฝ่ายควบคุมคุณภาพ



บริษัท เอ็นวิลแล็บ จำกัด
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Tel : 02-602-3577-8 Fax : 02-602-3773 E-mail : info@evltesting.com



Environmental Responsibility Measurement

TSP High Volume Sampler Calibration

Verification Report No.

SO2300039-E001 -TSP 03

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: วัดศรีปากะนาหวาส	
UTM : 47Q N 1808856 E 562734	
Sampler: ETSP#41	
Recorder: ECRANG15315230	
Date: 22 Feb 23	
Technical: Ananthan K	
Approval: [Signature]	

CONDITIONS

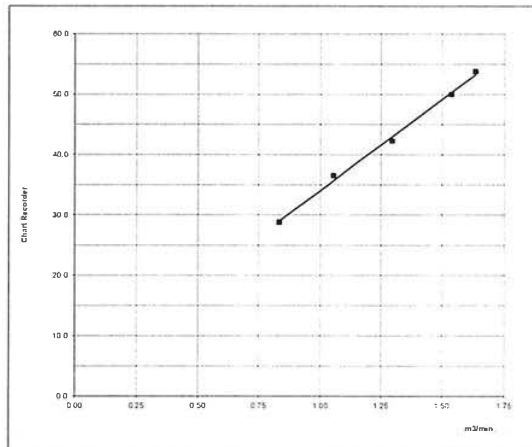
Barometric Press. (hPa): 1009.8	Corrected Pressure (mm Hg): 757.4
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Qstd Slope: 2.03736
Model: TE-5025A	Qstd Intercept: -0.03733
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	11.73	1.677	56.0	55.26	
2	10.38	1.579	52.0	51.31	Slope = 30.2683 Intercept = 3.9298 Corr. coeff. = 0.9979 # of Observations: 5 Range of Chart at 1.1 - 1.7 m3/min. 38 56
3	7.33	1.330	44.0	43.42	
4	4.82	1.082	38.0	37.50	
5	2.99	0.856	30.0	29.60	



Calibrated by :

22 February 2023

Approved by :

22 February 2023

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Environmental Responsibility with Accuracy Measurement

TSP High Volume Sampler Calibration

Verification Report No.

SO2300039-E001 -TSP 01

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: โรงเรียนบ้านใหม่	
UTM: 47Q N 1808517 E 565617	
Sampler: ETSP#40	
Recorder: ECRDCPR4169240	
Date: 22 Feb 23	Technical: [Redacted]
Approval: [Redacted]	

CONDITIONS

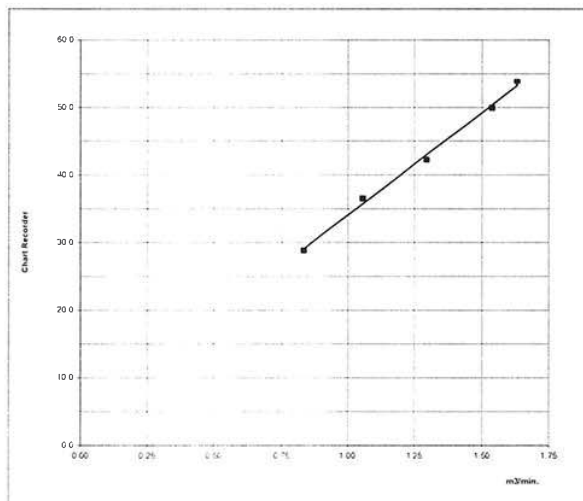
Barometric Press. (hPa): 951.0	Corrected Pressure (mm Hg): 713.3
Temperature (deg C): 30.0	Temperature (deg K): 303.0
Average Press. (hPa): 1013.0	Corrected Avg.Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Qstd Slope: 2.03736
Model: TE-5025A	Qstd Intercept: -0.03733
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION Slope = 30.2683 Intercept = 3.8117 Corr. coeff.= 0.9979 # of Observations: 5 Range of Chart at 1.1 - 1.7 m3/min. 39 57
1	11.73	1.633	56.0	53.80	
2	10.38	1.538	52.0	49.96	
3	7.33	1.295	44.0	42.27	
4	4.82	1.054	38.0	36.51	
5	2.99	0.834	30.0	28.82	



Calibrated by : [Redacted]

22 February 2023

Approved by : [Redacted]

22 February 2023

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EnviLab is a member of the Thai Environmental

TSP High Volume Sampler Calibration

Verification Report No.

SO2300039-E001 -TSP 04

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: วัดหัดกระหรือเขาทอง	
UTM : 47Q N 1809693 E 563556	
Sampler: ETSP#34	
Recorder: ECRDCPR4169233	
Date: 22 Feb 23	
Technical: [Redacted]	
Approval: [Redacted]	

CONDITIONS

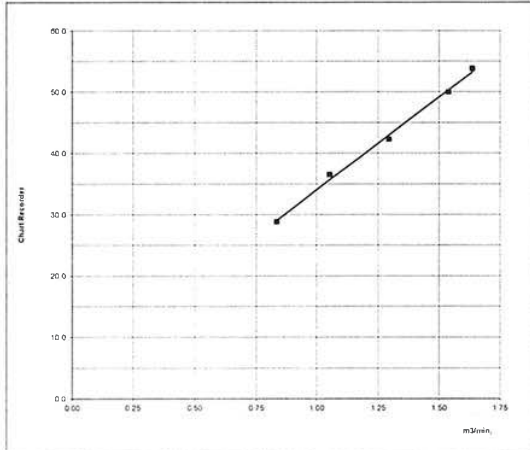
Barometric Press. (hPa): 1009.8	Corrected Pressure (mm Hg): 757.4
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg.Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Qstd Slope: 2.03736
Model: TE-5025A	Qstd Intercept: -0.03733
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION Slope = 29.6650 Intercept = 6.7877 Corr. coeff. = 0.9929 # of Observations: 5 Range of Chart at 1.1 - 1.7 m3/min. 40 57
1	11.63	1.670	58.0	57.23	
2	10.22	1.567	54.0	53.29	
3	7.34	1.331	46.0	45.39	
4	4.85	1.085	38.0	37.50	
5	2.98	0.854	34.0	33.55	



Calibrated by :

22 February 2023

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22 February 2023

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IE-MNT-29 Rev.00.01/08/53



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Tel : 02-802-3577-8 Fax: 02-802-3773 E-mail : info@evltesting.com



Environmental Responsibility Statement

TSP High Volume Sampler Calibration

Verification Report No.

SO2300039-E001 -TSP 02

☐ PM ☒ Onsite

Site: บริเวณภายนอกตึกฝ่ายวิศวกรรมผ่านใต้ลม

UTM : 47Q N 1808176 E 564012

Sampler: ETSP#32

Recorder: ECRANG15315229

Date: 22 Feb 23

Technical: [REDACTED]

Approval: [REDACTED]

CONDITIONS

Barometric Press. (hPa): 951.0

Temperature (deg C): 30.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 713.3

Temperature (deg K): 303.0

Corrected Avg.Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5025A

Serial#: 759

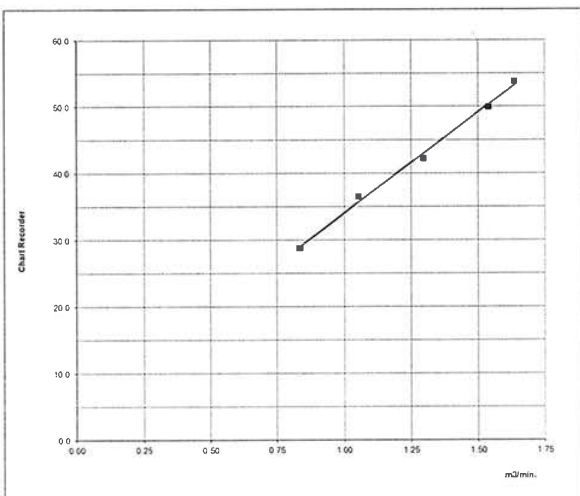
Qstd Slope: 2.03736

Qstd Intercept: -0.03733

Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION Slope = 30.5848 Intercept = -0.8665 Corr. coeff. = 0.9980 # of Observations: 5 Range of Chart at 1.1 - 1.7 m3/min.: 53
1	12.22	1.667	52.0	49.96	
2	9.14	1.444	46.0	44.20	
3	7.47	1.307	40.0	38.43	
4	4.77	1.048	32.0	30.74	
5	2.98	0.832	26.0	24.98	



Calibrated by : [REDACTED]

22 February 2023

Approved by : [REDACTED]

22 February 2023

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Envilab Co., Ltd. 540,540/1 Soi Bangkhoe 7 Bangkhoe Bangkok 10160
Tel : 02-802-3577-8 Fax: 02-802-3773 E-mail : info@evltesting.com



Envilab & Envilab Supply Network

TSP High Volume Sampler Calibration

Verification Report No.

SO2300039-E001 -TSP 03

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: บริเวณภายนอกซ้ายทิศทางลมพัดผ่านเหนือลม	
UTM : 47Q N 1808308 E 564079	
Date: 22 Feb 23	
Sampler: ETSP#36	
Technical: [REDACTED]	
Recorder: ECRANG15315221	
Approval: [REDACTED]	

CONDITIONS

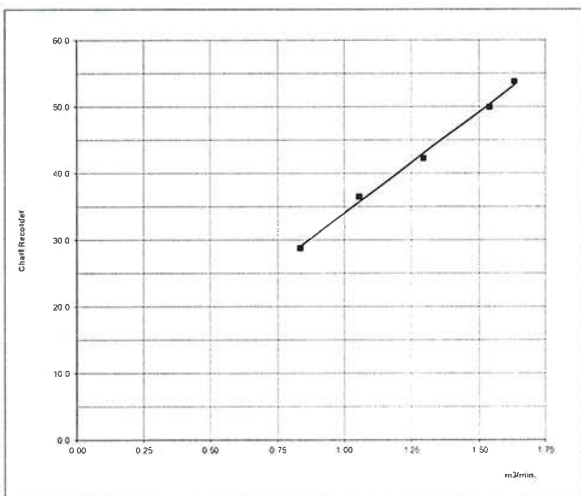
Barometric Press. (hPa): 1009.8	Corrected Pressure (mm Hg): 757.4
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg.Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Qstd Slope: 2.03736
Model: TE-5025A	Qstd Intercept: -0.03733
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	11.73	1.677	56.0	55.26	Slope = 30.2683
2	10.38	1.579	52.0	51.31	Intercept = 3.9298
3	7.33	1.330	44.0	43.42	Corr. coeff.= 0.9979
4	4.82	1.082	38.0	37.50	# of Observations: 5
5	2.99	0.856	30.0	29.60	Range of Chart at 1.1 - 1.7 m3/min. 56



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22 February 2023

Approved by :

22 February 2023

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Tel : 02-802-3577-8 Fax: 02-802-3773 E-mail : info@evltesting.com



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TSP High Volume Sampler Calibration

Verification Report No.

SO2300039-E001 -TSP 04

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: บริเวณภายในตึกชายทิศทางลมพัดผ่านใต้ลม	
UTM: 47Q N 1808192 E 564007	
Sampler: ETSP#31	
Recorder: ECRANG15315216	
Date: 22 Feb 23	
Technical: [Redacted]	
Approval: [Redacted]	

CONDITIONS

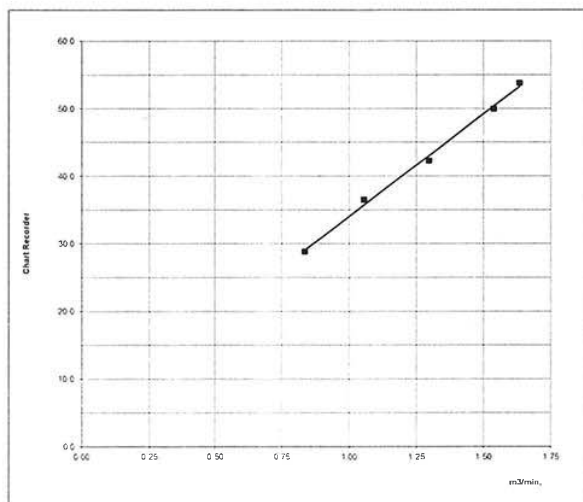
Barometric Press. (hPa): 1009.8	Corrected Pressure (mm Hg): 757.4
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Qstd Slope: 2.03736
Model: TE-5025A	Qstd Intercept: -0.03733
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION Slope = 29.6650 Intercept = 6.7877 Corr. coeff. = 0.9929 # of Observations: 5 Range of Chart at 1.1 - 1.7 m3/min.: 40 57
1	11.63	1.670	58.0	57.23	
2	10.22	1.567	54.0	53.29	
3	7.34	1.331	46.0	45.39	
4	4.85	1.085	38.0	37.50	
5	2.98	0.854	34.0	33.55	



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22 February 2023

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22 February 2023

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FE-MNT-29 Rev.00 01/08/63



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EnviLab Co., Ltd. 540,540/1 Soi Bangkhae 7 Bangkok Bangkhae Bangkok 10160
Tel : 02-802-3577-8 Fax. 02-802-3773 E-mail : info@evltesting.com



EnviLab & EnviLab Supply Instrument

TSP High Volume Sampler Calibration

Verification Report No.

SO2300039-E001 -TSP 05

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: บริเวณภายในตึกห้างสรรพสินค้า	
UTM : 47Q N 1808298 E 564080	
Date: 22 Feb 23	
Technical: [Redacted]	
Approval: [Redacted]	
Sampler: ETSP#33	
Recorder: ECRANG15315219	

CONDITIONS

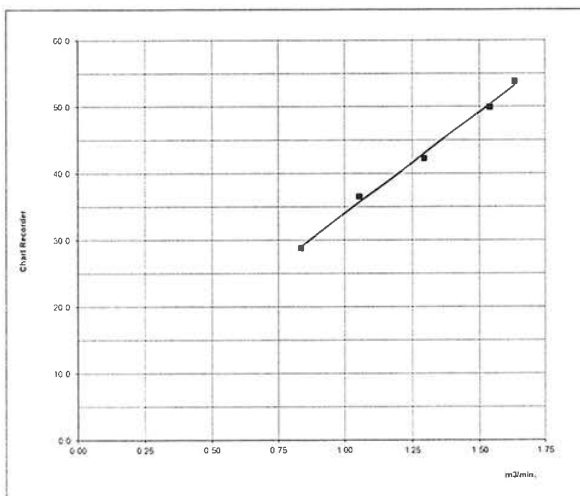
Barometric Press. (hPa): 1009.8	Corrected Pressure (mm Hg): 757.4
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Qstd Slope: 2.03736
Model: TE-5025A	Qstd Intercept: -0.03733
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	12.22	1.711	58.0	57.23	Slope = 31.1130
2	10.22	1.567	54.0	53.29	Intercept = 4.1387
3	7.34	1.331	46.0	45.39	Corr. coeff.= 0.9995
4	4.85	1.085	38.0	37.50	# of Observations: 5
5	3.11	0.872	32.0	31.58	Range of Chart 39
					at 1.1 - 1.7 m3/min. 57



Calibrated by :

22 February 2023

Approved by :

22 February 2023

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Envilab Co., Ltd. 540,540/1 Soi Bangnae 7 Bangnae Bangkok Bangkok 10160
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Envilab & Envilab (Sany) Vietnam

PM10 High Volume Sampler Calibration

Verification Report No.

SO2300039-E001 -PM 02

<input checked="" type="checkbox"/> PM	<input type="checkbox"/> Onsite
Site: วัดคลองสีนวน	
UTM : 47Q N 1806693 E 564840	
Sampler: EPM#35	
Recorder: ECRDS01618125	
Date: 22 Feb 23	
Technical: [Redacted]	
Approval: [Redacted]	

CONDITIONS

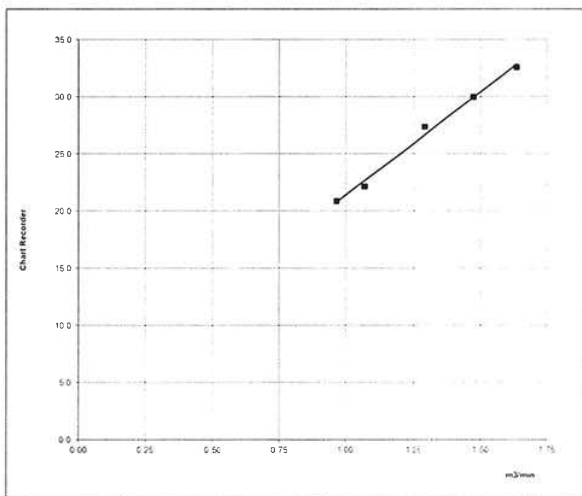
Barometric Press. (hPa): 945.7	Corrected Pressure (mm Hg): 709.3
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Slope: 1.27576
Model: TE-5025A	Intercept: -0.02337
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	11.73	1.779	56.0	36.72	Slope = 18.9535
2	10.38	1.674	52.0	34.10	Intercept = 2.6328
3	7.33	1.410	44.0	28.85	Corr. coeff. = 0.9979
4	4.82	1.147	38.0	24.92	SFR = 1.218
5	2.99	0.907	30.0	19.67	SSP = 39.23
					# of Observations: 5
					Range of Chart at SFR $\pm 10\%$
					37
					42



Calibrated by :

22 February 2023

Approved by :

22 February 2023

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PM10 Cal. Rev.07 / Iss. Date: Mar 17, 2020

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English is always your language

PM10 High Volume Sampler Calibration

Verification Report No.

SO2300039-E001 -PM 03

<input checked="" type="checkbox"/> PM	<input type="checkbox"/> Onsite
Site: วัดศรีปทุมมาวาส	
UTM : 47Q N 1808856 E 562734	
Sampler: EPM#37	
Recorder: ECRAN000004599	
Date: 22 Feb 23	
Technical: [Redacted]	
Approval: [Redacted]	

CONDITIONS

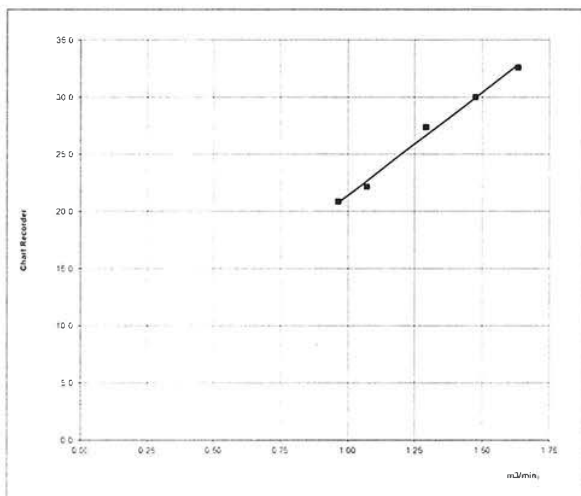
Barometric Press. (hPa): 1009.8	Corrected Pressure (mm Hg): 757.4
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg.Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Slope: 1.27576
Model: TE-5025A	Intercept: -0.02337
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	10.00	1.591	50.0	31.73	Slope = 18.0414
2	8.11	1.435	46.0	29.19	Intercept = 3.2854
3	6.21	1.258	42.0	26.65	Corr. coeff. = 0.9959
4	4.23	1.041	34.0	21.58	SFR = 1.141
5	3.43	0.940	32.0	20.31	SSP = 37.62
					# of Observations: 5
					Range of Chart at SFR $\pm 10\%$
					35
					40



Calibrated by :

22 February 2023

Approved by :

22 February 2023

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Environmental responsibility with accuracy measurement

PM10 Cal. Rev 07 / Iss. Date: Mar 17, 2020



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ผู้จัดการฝ่ายควบคุมคุณภาพ



บริษัท เอ็นไวเลบ จำกัด 540,540/1 ซอยบางพลี 7 แขวงบางพลี เขตบางพลี กรุงเทพมหานคร 10150
 EnviLab Co., Ltd. 540,540/1 Soi Bangkhoe 7 Bangkok Bangkhoe Bangkok 10150
 Tel: 02-802-3577-8 Fax: 02-802-3773 E-mail: info@evltesting.com



code & how to use

PM10 High Volume Sampler Calibration

Verification Report No.

SO2300039-E001 -PM 01

<input type="checkbox"/> PM <input checked="" type="checkbox"/> Onsite Site: โรงเรียนบ้านใหม่ UTM: 47Q N 1808517 E 565617 Sampler: EPM#36 Recorder: ECRDS01618124	Date: 22 Feb 23 Technical: Approval:
---	--

CONDITIONS

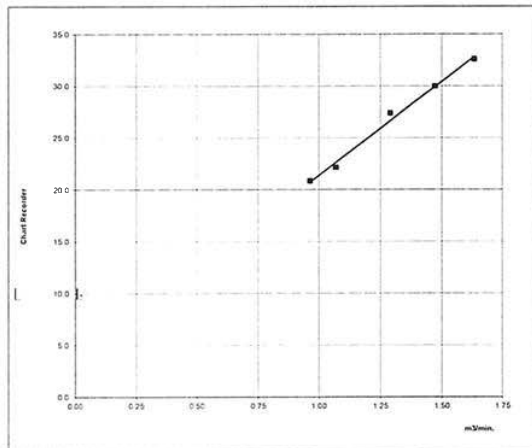
Barometric Press. (hPa): 951.0	Corrected Pressure (mm Hg): 713.3
Temperature (deg C): 30.0	Temperature (deg K): 303.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Slope: 1.27576
Model: TE-5025A	Intercept: -0.02337
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	10.00	1.634	50.0	32.59	
2	8.11	1.473	46.0	29.98	Slope = 18.0414 Intercept = 3.3833 Corr. coeff. = 0.9959 SFR = 1.204 SSP = 38.51 # of Observations: 5 Range of Chart at SFR $\pm 10\%$
3	6.21	1.291	42.0	27.37	
4	4.23	1.069	34.0	22.16	
5	3.43	0.964	32.0	20.86	
					36
					41



Calibrated by :

22 February 2023

Approved by :

22 February 2023

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FE-MMT-29 Rev.06/01/05/63



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บริษัท เอ็นวีเทสท์ จำกัด 540.540/1 ซอยบางเขน 7 แขวงบางเขน เขตบางเขน กรุงเทพมหานคร 10160
Envilab Co., Ltd. 540.540/1 Soi Bangkhoe 7 Bangkhoe Bangkok 10160
Tel : 02-802-3577-8 Fax: 02-802-3773 E-mail : info@evltesting.com



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PM10 High Volume Sampler Calibration

Verification Report No.

SO2300039-E001 -PM 04

☐ PM

☒ Onsite

Site: วัดท่าเดื่อศรีนคร

UTM : 47Q N 1809693 E 563556

Sampler: EPM#33

Recorder: ECRDS016187180

Date: 22 Feb 23

Technical:

Approval:

CONDITIONS

Barometric Press. (hPa): 1009.8

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.4

Temperature (deg K): 305.0

Corrected Avg. Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5025A

Serial#: 759

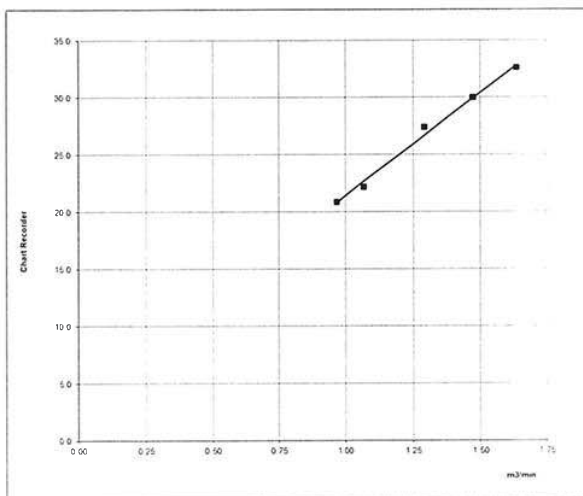
Slope: 1.27576

Intercept: -0.02337

Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	11.00	1.668	52.0	33.00	Slope = 15.1372
2	10.00	1.591	50.0	31.73	Intercept = 7.7274
3	5.87	1.223	42.0	26.65	Corr. coeff. = 0.9981
4	4.82	1.110	38.0	24.11	SFR = 1.141
5	3.21	0.910	34.0	21.58	SSP = 39.40
					# of Observations: 5
					Range of Chart at SFR $\pm 10\%$
					38
					41



Calibrated by :

22 February 2023

Approved by :

22 February 2023

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PM10 Cal. Rev.07 / Iss.Date: Mar 17, 2020

Environmental responsibility with accuracy measurement

FE-MNT-25 Rev.00.01/08/63



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 Envolab Co., Ltd. 540,540/1 Soi Bangna 7 Bangna Bangkok Bangkok 10160
 Tel : 02-802-3577-8 Fax : 02-802-9773 E-mail : info@evltesting.com



Envolab Co., Ltd. is a member of the Thai Environmental Engineering Association (T.E.E.A.)

PM10 High Volume Sampler Calibration

Verification Report No.

SO2300039-E001 -PM 02

<input type="checkbox"/> PM <input checked="" type="checkbox"/> Onsite Site: บริเวณภายนอกอาคารชายทิศทางลมพัดผ่านใต้ลม UTM : 47Q N 1808176 E 564012 Sampler: EPM#23 Recorder: ECRDS01618125	Date: 22 Feb 23 Technical: Approval:
--	--

CONDITIONS

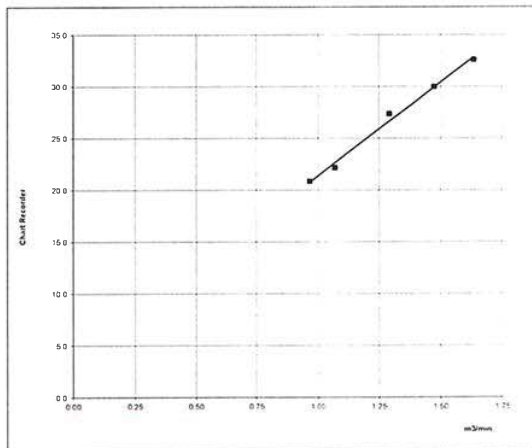
Barometric Press. (hPa): 945.7	Corrected Pressure (mm Hg): 709.3
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg.Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Slope: 1.27576
Model: TE-5025A	Intercept: -0.02337
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	11.73	1.779	56.0	36.72	
2	10.38	1.674	52.0	34.10	Slope = 18.9535 Intercept = 2.6328 Corr. coeff. = 0.9979 SFR = 1.218 SSP = 39.23 # of Observations: 5 Range of Chart at SFR $\pm 10\%$: 37 / 42
3	7.33	1.410	44.0	28.85	
4	4.82	1.147	38.0	24.92	
5	2.99	0.907	30.0	19.67	



Calibrated by :

22 February 2023

Approved by :

22 February 2023

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PM10 Cal. Rev.07 / Iss.Date: Mar 17, 2020

FE-MNT-29 Rev.00-01/08/63



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Tel : 02-802-3577-8 Fax: 02-802-3773 E-mail : info@evltesting.com



Envilab & Envilab Supply Network

PM10 High Volume Sampler Calibration

Verification Report No.

SO2300039-E001 -PM 03

<input checked="" type="checkbox"/> PM	<input type="checkbox"/> Onsite
Site: บริเวณภายนอกอาคารทิศทางลมพัดผ่านเหนือลม	
UTM : 47Q N 1808308 E 564079	
Sampler: EPM#41	
Recorder: ECRAN000004599	
Date: 22 Feb 23	
Technical: [Redacted]	
Approval: [Redacted]	

CONDITIONS

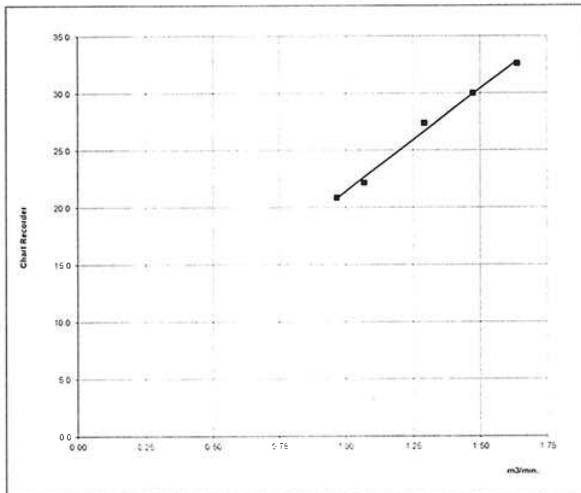
Barometric Press. (hPa): 1009.8	Corrected Pressure (mm Hg): 757.4
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg.Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Slope: 1.27576
Model: TE-5025A	Intercept: -0.02337
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	10.00	1.591	50.0	31.73	Slope = 18.0414
2	8.11	1.435	46.0	29.19	Intercept = 3.2854
3	6.21	1.258	42.0	26.65	Corr. coeff.= 0.9959
4	4.23	1.041	34.0	21.58	SFR = 1.141
5	3.43	0.940	32.0	20.31	SSP = 37.62
					# of Observations: 5
					Range of Chart at SFR $\pm 10\%$
					35
					40



Calibrated by :

22 February 2023

Approved by :

22 February 2023

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PM10 Cal. Rev.07 / Iss Date Mar 17, 2020



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ผู้จัดการฝ่ายควบคุมคุณภาพ



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Envirolab Co., Ltd. 540,540/1 Soi Bangkhoe 7 Bangkhuae Bangkhruai Bangkok 10150
Tel : 02-802-3577-8 Fax: 02-802-3773 E-mail : info@envitesting.com



by: 02-802-3577-8

PM10 High Volume Sampler Calibration

Verification Report No.

SO2300039-E001 -PM 04

☐ PM

☒ Onsite

Site: บริเวณภายในค่ายทหารผ่านแดน

UTM : 47Q N 1808192 E 564007

Sampler: EPM#43

Recorder: ECRDS016187180

Date: 22 Feb 23

Technical:

Approval:

CONDITIONS

Barometric Press. (hPa): 1009.8

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.4

Temperature (deg K): 305.0

Corrected Avg.Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5025A

Serial#: 759

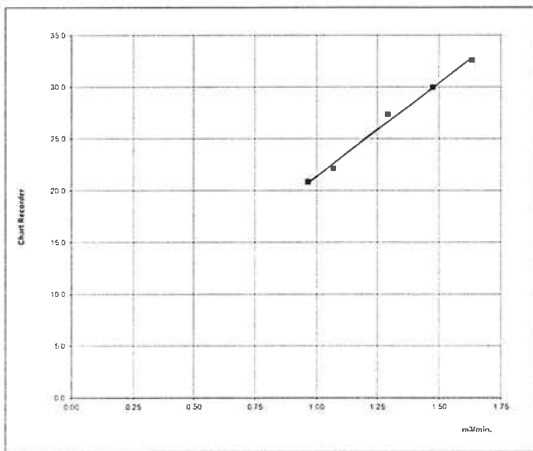
Slope: 1.27576

Intercept: -0.02337

Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	11.00	1.668	52.0	33.00	
2	10.00	1.591	50.0	31.73	Slope = 15.1372 Intercept = 7.7274 Corr. coeff. = 0.9981 SFR = 1.141 SSP = 39.40 # of Observations: 5 Range of Chart at SFR ±10% 38 41
3	5.87	1.223	42.0	26.65	
4	4.82	1.110	38.0	24.11	
5	3.21	0.910	34.0	21.58	



Calibrated by :

22 February 2023

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22 February 2023

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PM10 Cal. Rev.02 / Iss.Date: Mar 17, 2020

Environmental responsibility with accuracy measurement

EE-MNT-29 Rev.00 01/04/23



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 EnviLab Co., Ltd. 540,540/1 Soi Bangpliee 7 Bangpliee Bangkok Bangkok 10160
 Tel : 02-802-3577-18 Fax: 02-802-3773 E-mail : info@envitestesting.com



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PM10 High Volume Sampler Calibration

Verification Report No.

SO2300039-E001 -PM 05

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: บริเวณภายในค่ายที่สหจคมพัฒน์ผ่านเหนือลม	
UTM : 47Q N 1808298 E 564080	
Sampler: EPM#42	
Recorder: ECRDS016187189	
Date: 22 Feb 23	
Technical: [Redacted]	
Approval: [Redacted]	

CONDITIONS

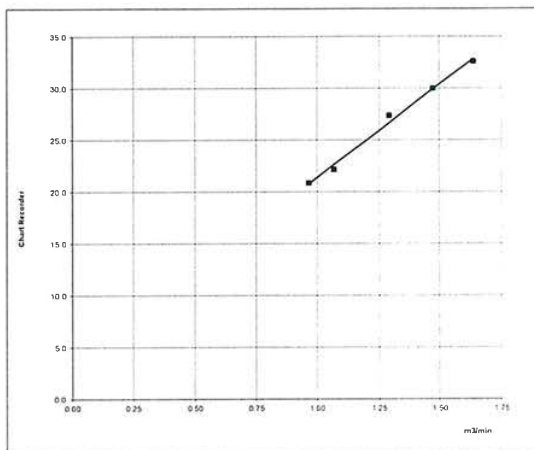
Barometric Press. (hPa): 1009.8	Corrected Pressure (mm Hg): 757.4
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Slope: 1.27576
Model: TE-5025A	Intercept: -0.02337
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	11.34	1.693	52.0	33.00	
2	10.00	1.591	50.0	31.73	Slope = 14.1551 Intercept = 9.0662 Corr. coeff. = 0.9967 SFR = 1.141 SSP = 39.74 # of Observations: 5 Range of Chart at SFR $\pm 10\%$
3	5.87	1.223	42.0	26.65	
4	4.82	1.110	38.0	24.11	
5	2.88	0.862	34.0	21.58	
					38
					41



Calibrated by :

22 February 2023

Approved by :

22 February 2023

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FE-MNT-29 Rev.00.01/06/03



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 ผู้จัดการฝ่ายควบคุมคุณภาพ



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 Envilab Co., Ltd. 560/57/1 Soi Bangkhen 7 Bangkok Bangkok 10160
 Tel : 02-602-3377-8 Fax: 02-602-3773 E-mail : info@envilabtesting.com



Environmental Responsibility with Accuracy

TSP High Volume Sampler Calibration

Verification Report No.

SO2300039-E002 -TSP 02

☐ PM ☒ Onsite

Site: วัดคลองสินทูล

UTM : 47Q N 1806693 E 564840

Sampler: ETSP#39

Recorder: ECRANG15315224

Date: 22 Mar 23

Technical:

Approval:

CONDITIONS

Barometric Press. (hPa): 951.0

Temperature (deg C): 30.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 713.3

Temperature (deg K): 303.0

Corrected Avg.Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5025A

Serial#: 759

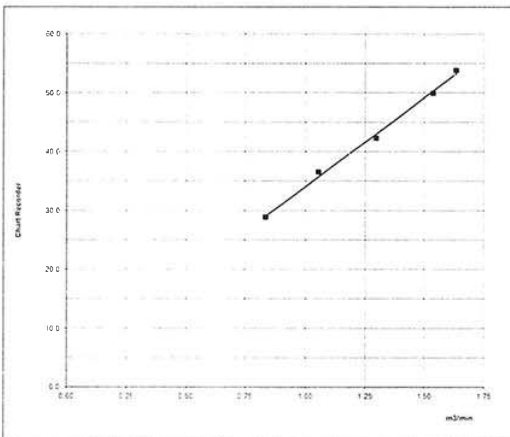
Qstd Slope: 2.03736

Qstd Intercept: -0.03733

Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Qstd (m ³ /min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	12.22	1.667	52.0	49.96	
2	9.14	1.444	46.0	44.20	Slope = 30.5848 Intercept = -0.8665 Corr. coeff. = 0.9980 # of Observations: 5 Range of Chart at 1.1 - 1.7 m ³ /min. 35 53
3	7.47	1.307	40.0	38.43	
4	4.77	1.048	32.0	30.74	
5	2.98	0.832	26.0	24.98	



Calibrated by :

22 March 2023

Approved by :

22 March 2023

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FE-MNT-29 Rev. 00 01/08/11



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บริษัท เอ็นวิลเทส จำกัด 540,540/1 ถนนพหลโยธิน 7 แขวงบางนาแค เขตบางนา กรุงเทพมหานคร 10160
Envilab Co., Ltd. 540,540/1 Soi Bangkhao 7 Bangkhao Bangkok 10160
Tel : 02-803-3577-8 Fax: 02-803-3773 E-mail : info@evltesting.com



Created: 8 Feb 2023, 10:00 AM

PM10 High Volume Sampler Calibration

Verification Report No.

SO2300039-E002 -PM 02

☐ PM ☒ Onsite

Site: วัดคลองลิ้นจี่

UTM: 47Q N 1806693 E 564840

Sampler: EPM#35

Recorder: ECRDS01618125

Date: 22 Mar 23

Technical: [Redacted]

Approval: [Redacted]

CONDITIONS

Barometric Press. (hPa): 945.7

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 709.3

Temperature (deg K): 305.0

Corrected Avg. Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5025A

Serial#: 759

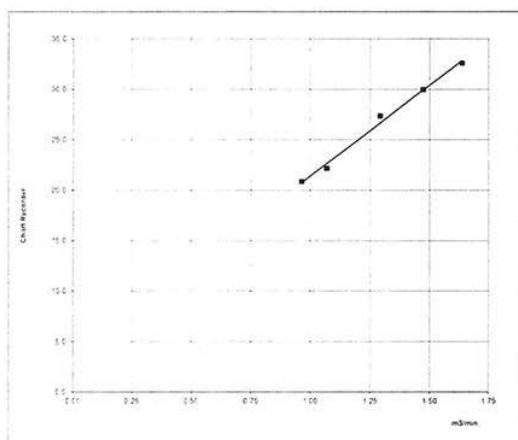
Slope: 1.27576

Intercept: -0.02337

Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	11.73	1.779	56.0	36.72	Slope = 18.9535
2	10.38	1.674	52.0	34.10	Intercept = 2.6328
3	7.33	1.410	44.0	28.85	Corr. coeff. = 0.9979
4	4.82	1.147	38.0	24.92	SFR = 1.218
5	2.99	0.907	30.0	19.67	SSP = 39.23
					# of Observations: 5
					Range of Chart at SFR $\pm 10\%$
					37
					42



Calibrated by : [Redacted]

22 March 2023

Approved by : [Redacted]

22 March 2023

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PM10 Cal Rev 07 / Iss Date Mar 17, 2020

Environmental responsibility with accuracy measurement

FE-MNT-28 Rev 00 01/09/23



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 Envilab Co., Ltd. 560,540/1 Soi Bangna-soi 7 Bang Na Bang Na Bangkok 10140
 Tel : 02-802-3377-8 Fax: 02-802-3773 E-mail : info@evltesting.com



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TSP High Volume Sampler Calibration

Verification Report No.

SO2300039-E002 -TSP 03

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: วัดศรีปทุมมาวาส	
UTM : 47Q N 1808856 E 562734	
Sampler: ETSP#34	
Recorder: ECRANG15315230	
Date: 22 Mar 23	Technical: [Redacted]
Approval: [Redacted]	

CONDITIONS

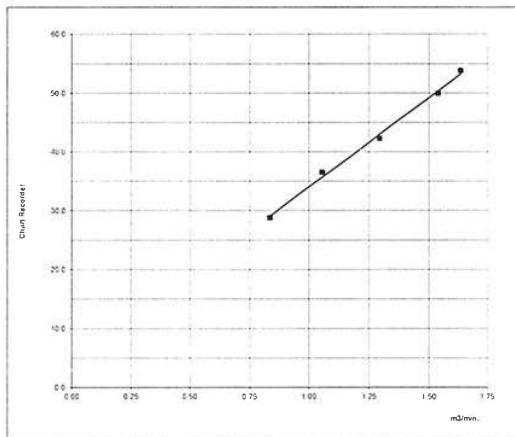
Barometric Press. (hPa): 1009.8	Corrected Pressure (mm Hg): 757.4
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg.Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Qstd Slope: 2.03736
Model: TE-5025A	Qstd Intercept: -0.03733
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Qstd (m ³ /min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	11.73	1.677	56.0	55.26	
2	10.38	1.579	52.0	51.31	Slope = 30.2683 Intercept = 3.9298 Corr. coeff. = 0.9979 # of Observations: 5 Range of Chart at 1.1 - 1.7 m ³ /min.
3	7.33	1.330	44.0	43.42	
4	4.82	1.082	38.0	37.50	
5	2.99	0.856	30.0	29.60	



Calibrated by :

22 March 2023

Approved by :

22 March 2023

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Envilab Co., Ltd. 540/5071 Soi Bangkhuat Bangkhuat Bangkok 10160
Tel : 02-803-3577-8 Fax: 02-802-3773 E-mail : info@envilab.com



envilab.com

PM10 High Volume Sampler Calibration

Verification Report No.

SO2300039-E002 -PM 03

☐ PM ☒ Onsite

Site: วัดศรีปทุมมาวาส

UTM : 47Q N 1808856 E 562734

Sampler: EPM#30

Recorder: ECRAN000004599

Date: 22 Mar 23

Technical:

Approval:

CONDITIONS

Barometric Press. (hPa): 1009.8

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.4

Temperature (deg K): 305.0

Corrected Avg. Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5025A

Serial#: 759

Slope:

1.27576

Intercept:

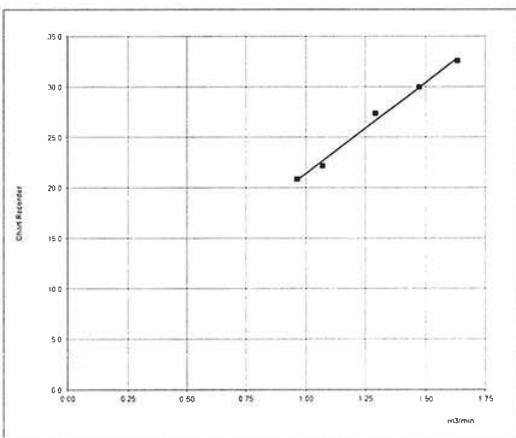
-0.02337

Date Certified:

18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	10.00	1.591	50.0	31.73	Slope = 18.0414
2	8.11	1.435	46.0	29.19	Intercept = 3.2854
3	6.21	1.258	42.0	26.65	Corr. coeff. = 0.9959
4	4.23	1.041	34.0	21.58	SFR = 1.141
5	3.43	0.940	32.0	20.31	SSP = 37.62
					# of Observations: 5
					Range of Chart 35
					at SFR $\pm 10\%$ 40



Calibrated by :

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PM10 Cal. Rev.07 / Iss. Date Mar 17, 2020



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Envilab Co., Ltd. 540,540/1 Soi Bangkhae 7 Bangkhae Bangkok 10160
Tel : 02-802-3577-8 Fax. 02-802-3773 E-mail : info@evltesting.com



Envilab & Needles Supply Instrument

TSP High Volume Sampler Calibration

Verification Report No.

SO2300039-E002 -TSP 01

<input type="checkbox"/> PM <input checked="" type="checkbox"/> Onsite	Site: โรงเรียนบ้านใหม่	Date: 22 Mar 23
	UTM : 47Q N 1808517 E 565617	Technical: [Redacted]
	Sampler: ETSP#44	Approval: [Redacted]
	Recorder: ECRDCPR4169240	

CONDITIONS

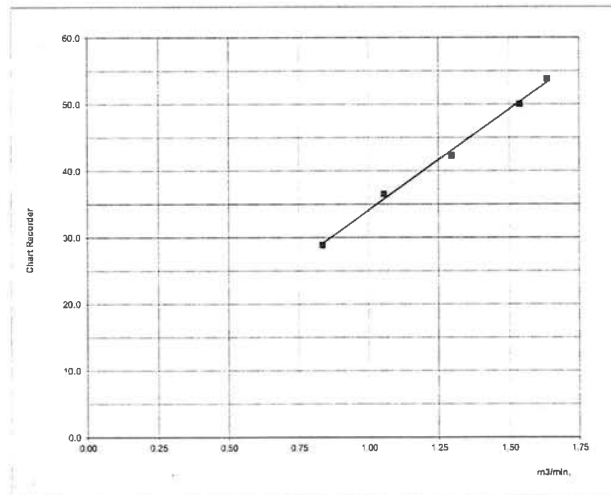
Barometric Press. (hPa): 951.0	Corrected Pressure (mm Hg): 713.3
Temperature (deg C): 30.0	Temperature (deg K): 303.0
Average Press. (hPa): 1013.0	Corrected Avg.Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Qstd Slope: 2.03736
Model: TE-5025A	Qstd Intercept: -0.03733
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	11.73	1.633	56.0	53.80	Slope = 30.2683
2	10.38	1.538	52.0	49.96	Intercept = 3.8117
3	7.33	1.295	44.0	42.27	Corr. coeff. = 0.9979
4	4.82	1.054	38.0	36.51	# of Observations: 5
5	2.99	0.834	30.0	28.82	Range of Chart 39
					at 1.1 - 1.7 m3/min. 57



Calibrated by :

22 March 2023

Approved by :

22 March 2023

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Envilab Co., Ltd. 540,540/1 Soi Bangkhae 7 Bangkhae Bangkok Bangkok 10160
Tel : 02-802-3577-8 Fax. 02-802-3773 E-mail : info@evitestesting.com



Envilab 3 Needles Supply Instrument

PM10 High Volume Sampler Calibration

Verification Report No.

SO2300039-E002 -PM 01

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: <u>โรงเรียนบ้านใหม่</u>	
UTM : <u>47Q N 1808517 E 565617</u>	
Sampler: <u>EPM#34</u>	
Recorder: <u>ECRDS01618124</u>	
Date: <u>22 Mar 23</u>	
Technical: <u>[Redacted]</u>	
Approval: <u>[Redacted]</u>	

CONDITIONS

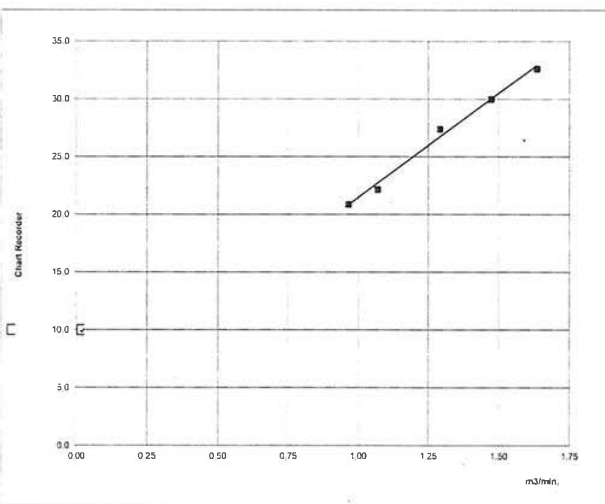
Barometric Press. (hPa): 951.0	Corrected Pressure (mm Hg): 713.3
Temperature (deg C): 30.0	Temperature (deg K): 303.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Slope: 1.27576
Model: TE-5025A	Intercept: -0.02337
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	10.00	1.634	50.0	32.59	Slope = 18.0414
2	8.11	1.473	46.0	29.98	Intercept = 3.3833
3	6.21	1.291	42.0	27.37	Corr. coeff. = 0.9959
4	4.23	1.069	34.0	22.16	SFR = 1.204
5	3.43	0.964	32.0	20.86	SSP = 38.51
					# of Observations: 5
					Range of Chart at SFR $\pm 10\%$
					36
					41



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EnviLab Co., Ltd. 540,540/1 Soi Bangkaka 7 Bangkaka Bangkok 10160
Tel : 02-802-3377-8 Fax : 02-802-3377-9 E-mail : info@envilabtesting.com



EnviLab Co., Ltd. 540,540/1 Soi Bangkaka 7

TSP High Volume Sampler Calibration

Verification Report No.

SO2300039-E002 -TSP 04

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: วัดท่าตะครีบกเขาทอง	
UTM : 47Q N 1809693 E 563556	
Sampler: ETSP#37	
Recorder: ECRDCPR4169233	
Date: 22 Mar 23	
Technical: [Redacted]	
Approval: [Redacted]	

CONDITIONS

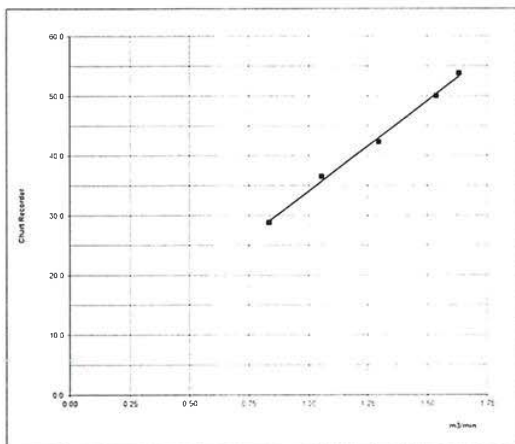
Barometric Press. (hPa): 1009.8	Corrected Pressure (mm Hg): 757.4
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Qstd Slope: 2.03736
Model: TE-5025A	Qstd Intercept: -0.03733
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION Slope = 29.6650 Intercept = 6.7877 Corr. coeff. = 0.9929 # of Observations: 5 Range of Chart at 1.1 - 1.7 m3/min. 40 57
1	11.63	1.670	58.0	57.23	
2	10.22	1.567	54.0	53.29	
3	7.34	1.331	46.0	45.39	
4	4.85	1.085	38.0	37.50	
5	2.98	0.854	34.0	33.55	



Calibrated by :

22 March 2023

Approved by :

22 March 2023

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EnviLab Co., Ltd. 512,540/1 Soi Bangplae 7 Bangplae Bangkok Bangkok 10150
โทรศัพท์: 02-842-8577-8 Fax: 02-842-3773 E-mail: info@evltesting.com



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PM10 High Volume Sampler Calibration

Verification Report No.

SO2300039-E002 -PM 04

☐ PM

☒ Onsite

Site: วัดท่าตะครีเขมาทอง

UTM : 47Q N 1809693 E 563556

Sampler: EPM#32

Recorder: ECRDS016187180

Date: 22 Mar 23

Technical: [REDACTED]

Approval: [REDACTED]

CONDITIONS

Barometric Press. (hPa): 1009.8

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.4

Temperature (deg K): 305.0

Corrected Avg. Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5025A

Serial#: 759

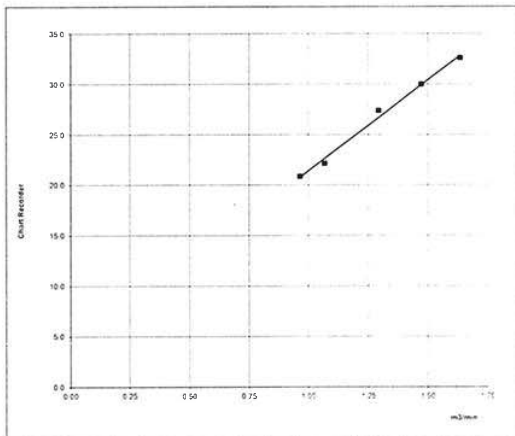
Slope: 1.27576

Intercept: -0.02337

Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	11.00	1.668	52.0	33.00	Slope = 15.1372
2	10.00	1.591	50.0	31.73	Intercept = 7.7274
3	5.87	1.223	42.0	26.65	Corr. coeff. = 0.9981
4	4.82	1.110	38.0	24.11	SFR = 1.141
5	3.21	0.910	34.0	21.58	SSP = 39.40
					# of Observations: 5
					Range of Chart at SFR $\pm 10\%$
					38
					41



Calibrated by : [REDACTED]

22 March 2023

Approved by : [REDACTED]

22 March 2023

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PM10 Cal. Rev.07 / No. Date Mar 17, 2020

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Envilab Co., Ltd. 540,540/1 Soi Bangkhae 7 Bangkhae Bangkok Bangkok 10160
Tel : 02-802-3577-8 Fax. 02-802-3773 E-mail : info@evltesting.com



Envilab & Needles Supply Instrument

TSP High Volume Sampler Calibration

Verification Report No.

SO2300039-E002 -TSP 02

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: บริเวณภายนอกค่ายีตทางลมพัดผ่านใต้ลม	
UTM : 47Q N 1808176 E 564012	
Sampler: ETSP#33	
Recorder: ECRANG15315229	
Date: 22 Mar 23	
Technical: [Redacted]	
Approval: [Redacted]	

CONDITIONS

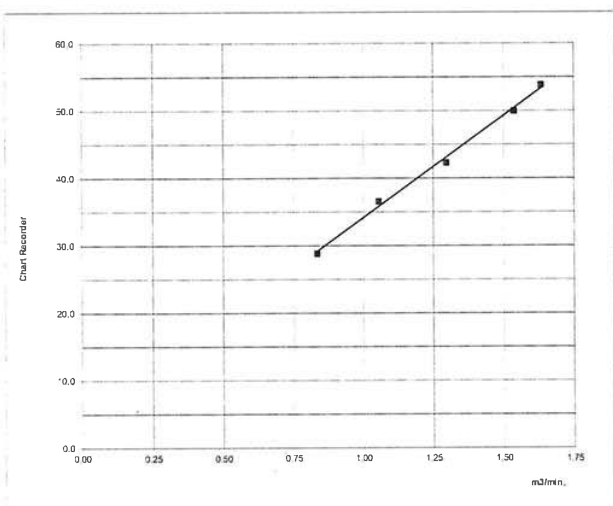
Barometric Press. (hPa): 951.0	Corrected Pressure (mm Hg): 713.3
Temperature (deg C): 30.0	Temperature (deg K): 303.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Qstd Slope: 2.03736
Model: TE-5025A	Qstd Intercept: -0.03733
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	12.22	1.667	52.0	49.96	Slope = 30.5848
2	9.14	1.444	46.0	44.20	Intercept = -0.8665
3	7.47	1.307	40.0	38.43	Corr. coeff. = 0.9980
4	4.77	1.048	32.0	30.74	# of Observations: 5
5	2.98	0.832	26.0	24.98	Range of Chart at 1.1 - 1.7 m3/min. 35
					53



Calibrated by :

22 March 2023

Approved by :

22 March 2023

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Tel : 02-802-3577-8 Fax: 02-802-3773 E-mail : info@evltesting.com



Envilab & Needles Supply Instrument

PM10 High Volume Sampler Calibration

Verification Report No.

SO2300039-E002 -PM 02

☐ PM ☒ Onsite

Site: บริเวณภายนอกตึกทางลมพัดผ่านใต้ลม

UTM : 47Q N 1808176 E 564012

Sampler: EPM#23

Recorder: ECRDS01618125

Date: 22 Mar 23

Technical:

Approval:

CONDITIONS

Barometric Press. (hPa): 945.7

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 709.3

Temperature (deg K): 305.0

Corrected Avg. Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5025A

Serial#: 759

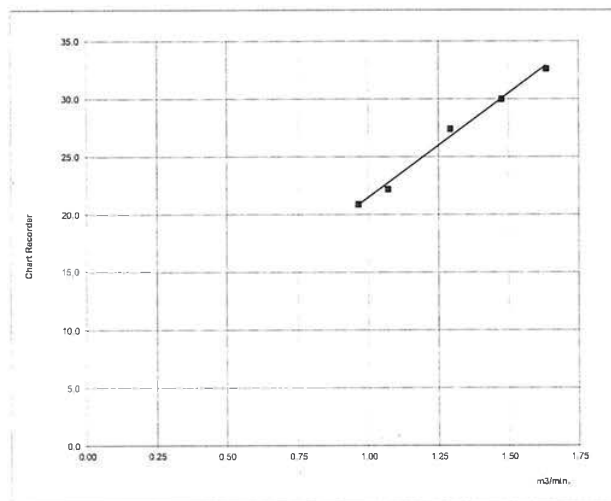
Slope: 1.27576

Intercept: -0.02337

Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	11.73	1.779	56.0	36.72	Slope = 18.9535
2	10.38	1.674	52.0	34.10	Intercept = 2.6328
3	7.33	1.410	44.0	28.85	Corr. coeff. = 0.9979
4	4.82	1.147	38.0	24.92	SFR = 1.218
5	2.99	0.907	30.0	19.67	SSP = 39.23
					# of Observations: 5
					Range of Chart at SFR $\pm 10\%$
					37
					42



Calibrated by :

22 March 2023

Approved by :

22 March 2023

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PM10 Cal. Rev.07 / Iss.Date: Mar 17, 2020

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Envilab Co., Ltd. 540,540/1 Soi Bangkhae 7 Bangkhae Bangkok 10160
Tel : 02-802-3577-8 Fax. 02-802-3773 E-mail : info@evltesting.com



Envilab & Needles Supply Instrument

TSP High Volume Sampler Calibration

Verification Report No.

SO2300039-E002 -TSP 03

<input type="checkbox"/> PM <input checked="" type="checkbox"/> Onsite	Site: บริเวณภายนอกตึกฝ่ายวิศวกรรมพัฒนาเหนือลม	Date: 22 Mar 23
	UTM : 47Q N 1808308 E 564079	Technical: [Redacted]
	Sampler: ETSP#35	Approval: [Redacted]
	Recorder: ECRANG15315221	

CONDITIONS

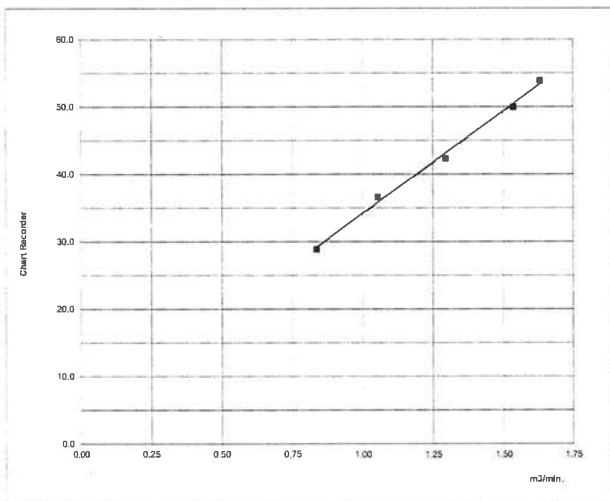
Barometric Press. (hPa): 1009.8	Corrected Pressure (mm Hg): 757.4
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Qstd Slope: 2.03736
Model: TE-5025A	Qstd Intercept: -0.03733
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION Slope = 30.2683 Intercept = 3.9298 Corr. coeff.= 0.9979 # of Observations: 5 Range of Chart at 1.1 - 1.7 m3/min. 38 56
1	11.73	1.677	56.0	55.26	
2	10.38	1.579	52.0	51.31	
3	7.33	1.330	44.0	43.42	
4	4.82	1.082	38.0	37.50	
5	2.99	0.856	30.0	29.60	



Calibrated by :

22 March 2023

Approved by :

22 March 2023

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Envilab Co., Ltd. 540,540/1 Soi Bangkhae 7 Bangkhae Bangkok Bangkok 10160
Tel : 02-802-3577-8 Fax: 02-802-3773 E-mail : info@evltesting.com



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PM10 High Volume Sampler Calibration

Verification Report No.

SO2300039-E002 -PM 03

☐ PM ☒ Onsite

Site: บริเวณภายนอกอาคารที่สถานีขนส่งผู้โดยสาร

UTM : 47Q N 1808308 E 564079

Sampler: EPM#31

Recorder: ECRAN000004599

Date: 22 Mar 23

Technical:

Approval:

CONDITIONS

Barometric Press. (hPa): 1009.8

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.4

Temperature (deg K): 305.0

Corrected Avg.Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5025A

Serial#: 759

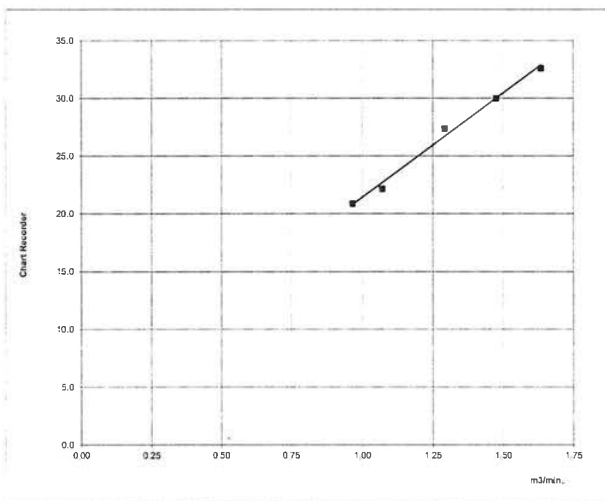
Slope: 1.27576

Intercept: -0.02337

Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	10.00	1.591	50.0	31.73	Slope = 18.0414
2	8.11	1.435	46.0	29.19	Intercept = 3.2854
3	6.21	1.258	42.0	26.65	Corr. coeff. = 0.9959
4	4.23	1.041	34.0	21.58	SFR = 1.141
5	3.43	0.940	32.0	20.31	SSP = 37.62
					# of Observations: 5
					Range of Chart at SFR $\pm 10\%$
					35
					40



Calibrated by :

22 March 2023

Approved by :

22 March 2023

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Environmental responsibility with accuracy measurement

PM10 Cal, Rev.07 / Iss.Date, Mar 17, 2020



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ผู้จัดการฝ่ายควบคุมคุณภาพ



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Envilab & Needles Supply Instrument

TSP High Volume Sampler Calibration

Verification Report No.

SO2300039-E002 -TSP 04

<input type="checkbox"/> PM <input checked="" type="checkbox"/> Onsite	Site: บริเวณภายในตึกห้างสรรพสินค้า	Date: 22 Mar 23
	UTM : 47Q N 1808192 E 564007	Technical: [Redacted]
	Sampler: ETSP#32	Approval: [Redacted]
	Recorder: ECRANG15315216	

CONDITIONS

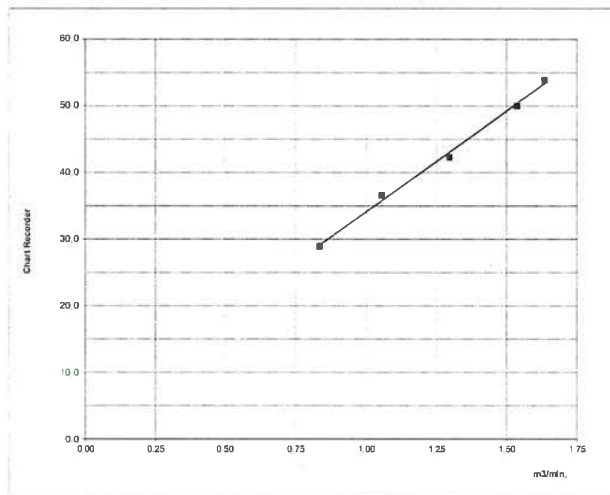
Barometric Press. (hPa): 1009.8	Corrected Pressure (mm Hg): 757.4
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Qstd Slope: 2.03736
Model: TE-5025A	Qstd Intercept: -0.03733
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	11.63	1.670	58.0	57.23	
2	10.22	1.567	54.0	53.29	Slope = 29.6650 Intercept = 6.7877 Corr. coeff = 0.9929 # of Observations: 5 Range of Chart at 1.1 - 1.7 m3/min. 40 57
3	7.34	1.331	46.0	45.39	
4	4.85	1.085	38.0	37.50	
5	2.98	0.854	34.0	33.55	



Calibrated by :

22 March 2023

Approved by :

22 March 2023

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PE-MNT-29 Rev.00/01/08/63



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Tel : 02-802-3577-8 Fax: 02-802-3773 E-mail : info@envitest.com



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PM10 High Volume Sampler Calibration

Verification Report No.

SO2300039-E002 -PM 04

☐ PM

☒ Onsite

Site: บริเวณภายในตึกห้างสรรพสินค้า

UTM : 47Q N 1808192 E 564007

Sampler: EPM#33

Recorder: ECRDS016187180

Date: 22 Mar 23

Technical: [REDACTED]

Approval: [REDACTED]

CONDITIONS

Barometric Press. (hPa): 1009.8

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.4

Temperature (deg K): 305.0

Corrected Avg.Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5025A

Serial#: 759

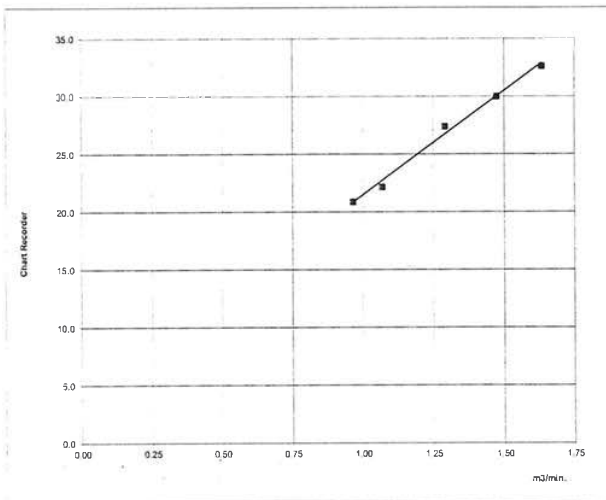
Slope: 1.27576

Intercept: -0.02337

Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION	
1	11.00	1.668	52.0	33.00	Slope =	15.1372
2	10.00	1.591	50.0	31.73	Intercept =	7.7274
3	5.87	1.223	42.0	26.65	Corr. coeff.=	0.9981
4	4.82	1.110	38.0	24.11	SFR =	1.141
5	3.21	0.910	34.0	21.58	SSP =	39.40
					# of Observations:	5
					Range of Chart at SFR ±10%	38 41



Calibrated by : [REDACTED]

22 March 2023

Approved by : [REDACTED]

22 March 2023

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PM10 Cal. Rev.07 / Iss.Date: Mar 17, 2020

Environmental responsibility with accuracy measurement

FE-MNT-29 Rev.00:01/08/63



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ผู้จัดการฝ่ายควบคุมคุณภาพ



TSP High Volume Sampler Calibration

Verification Report No.

SO2300039-E002 -TSP 05

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: บริเวณภายในค่ายทหารผ่านแดน	
UTM : 47Q N 1808298 E 564080	
Sampler: ETSP#42	
Recorder: ECRANG15315219	
Date: 22 Mar 23	
Technical: [Redacted]	
Approval: [Redacted]	

CONDITIONS

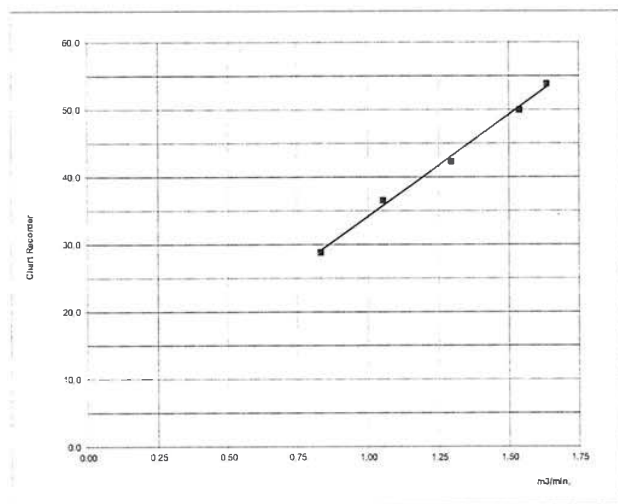
Barometric Press. (hPa): 1009.8	Corrected Pressure (mm Hg): 757.4
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Qstd Slope: 2.03736
Model: TE-5025A	Qstd Intercept: -0.03733
Serial#: 759	Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Qstd (m ³ /min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	12.22	1.711	58.0	57.23	Slope = 31.1130
2	10.22	1.567	54.0	53.29	Intercept = 4.1387
3	7.34	1.331	46.0	45.39	Corr. coeff. = 0.9995
4	4.85	1.085	38.0	37.50	# of Observations: 5
5	3.11	0.872	32.0	31.58	Range of Chart at 1.1 - 1.7 m ³ /min.: 39
					57



Calibrated by :

22 March 2023

Approved by :

22 March 2023

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FE-MNT-27 Rev.00 (01/08/63)

FE-MNT-29 Rev.00:01/08/63



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PM10 High Volume Sampler Calibration

Verification Report No.

SO2300039-E002 -PM 05

☐ PM ☒ Onsite

Site: บริเวณภายในค่ายที่สหทางลมพัดผ่านเหนือลม

UTM : 47Q N 1808298 E 564080

Sampler: EPM#36

Recorder: ECRDS016187189

Date: 22 Mar 23

Technical: [REDACTED]

Approval: [REDACTED]

CONDITIONS

Barometric Press. (hPa): 1009.8

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.4

Temperature (deg K): 305.0

Corrected Avg. Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5025A

Serial#: 759

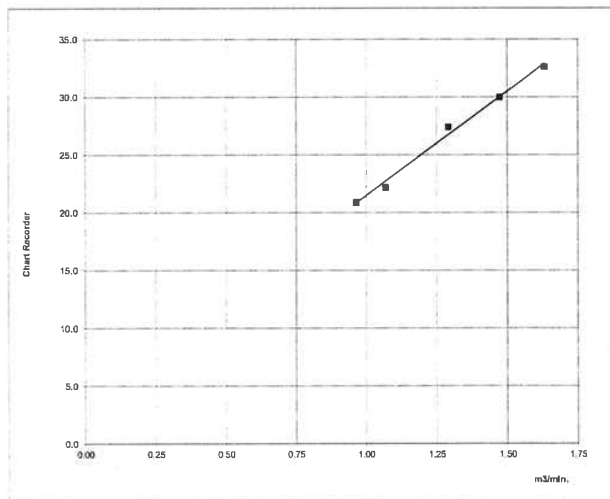
Slope: 1.27576

Intercept: -0.02337

Date Certified: 18 Jan 23

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	11.34	1.693	52.0	33.00	Slope = 14.1551
2	10.00	1.591	50.0	31.73	Intercept = 9.0662
3	5.87	1.223	42.0	26.65	Corr. coeff. = 0.9967
4	4.82	1.110	38.0	24.11	SFR = 1.141
5	2.88	0.862	34.0	21.58	SSP = 39.74
					# of Observations: 5
					Range of Chart at SFR $\pm 10\%$
					38
					41



Calibrated by : [REDACTED]

22 March 2023

Approved by : [REDACTED]

22 March 2023

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PM10 Cal. Rev.07 / Iss.Date, Mar 17, 2020

FE-MNT-29 Rev.00.01/08/53



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Tel : 02-802-3577-8 Fax: 02-802-3773 E-mail : info@evltesting.com



Envilab & Person's Supply Instrument

Verification Test Report

Report No.:

SO2300039-E001 -SLM 01

☐ PM ☒ Onsite UTM : 47Q N 1808471 E 563729

Calibrated Date: 22 February 2023

Site : บริเวณริมรั้วโรงงานด้านทิศเหนือ

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0018

Environment: Temperature 30 °C Humidity 57 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230, Bruel&Kjaer

Serial No.1351075

Date of Calibration : March.21, 2022

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.66	93.90	0.24	93.66

Calibrated By:

Date: 22 February 2023

Approve By:

Date: 22 February 2023

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ISO 9001 & 14001:2015 CERTIFIED

Verification Test Report

Report No.:

SO2300039-E001 -SLM 02

☐ PM

☒ Onsite UTM :

47Q N 1808197 E 563680

Calibrated Date: 22 February 2023

Site : บริเวณริมรั้วโรงงานด้านทิศตะวันตก

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0027

Environment: Temperature 30 °C Humidity 57 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230, Bruel&Kjaer

Serial No.1351075

Date of Calibration : March.21, 2022

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.66	93.80	0.14	93.66

Calibrated By:

Date:

22 February 2023

Approve By:

Date:

22 February 2023

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Envilab Co., Ltd. 540,540/1 Soi Bangkhae 7 Bangkhae Bangkok Bangkok 10160
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Envilab & Needst Supply Instrument

Verification Test Report

Report No.:

SO2300039-E001 -SLM 03

☐ PM ☒ Onsite UTM : 47Q N 1808049 E 563983

Calibrated Date: 22 February 2023

Site : บริเวณริมรั้วโรงงานด้านทิศใต้

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0022

Environment: Temperature 30 °C Humidity 57 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230,Bruel&Kjaer

Serial No.1351075

Date of Calibration : March.21, 2022

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.66	93.90	0.24	93.66

Calibrated By:

Date: 22 February 2023

Approve By:

Date: 22 February 2023

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Envilab & Needon Supply Instrument

Verification Test Report

Report No.:

SO2300039-E001 -SLM 04

☐ PM

☒ Onsite UTM :

47Q N 1808308 E 564096

Calibrated Date: 22 February 2023

Site : บริเวณริมรั้วโรงงานด้านทิศตะวันออก

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0024

Environment: Temperature 30 °C Humidity 57 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230, Bruel&Kjaer

Serial No.1351075

Date of Calibration : March.21, 2022

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.66	93.90	0.24	93.66

Calibrated By:

Date: 22 February 2023

Approve By:

Date: 22 February 2023

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Envilab & Needss Supply Instrument

Verification Test Report

Report No.:

SO2300039-E001 -SLM 05

☐ PM ☒ Onsite UTM : 47Q N 1808303 E 564182

Calibrated Date: 22 February 2023

Site : บริเวณบ้านใหม่

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0016

Environment: Temperature 30 °C Humidity 57 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230, Bruel&Kjaer
Serial No.1351075
Date of Calibration : March.21, 2022

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.66	93.90	0.24	93.66

Calibrated By:

Date: 22 February 2023

Approve By:

Date: 22 February 2023

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Envilab & Needlab Supply Instrument

Verification Test Report

Report No.:

SO2300039-E001 -SLM 06

☐ PM

☒ Onsite UTM :

47Q N 1808617 E 563423

Calibrated Date: 22 February 2023

Site : บ้านท้ายเกาะ

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0015

Environment: Temperature 30 °C Humidity 57 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230,Bruel&Kjaer

Serial No.1351075

Date of Calibration : March.21, 2022

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.66	93.70	0.04	93.66

Calibrated By:

Date:

22 February 2023

Approve By:

Date:

22 February 2023

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ผู้ตรวจหาความถูกต้องคุณภาพ



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Envilab & Envilab Supply Instruments

Verification Test Report

Report No.:

SO2300039-E017 -SLM 01

☒ PM ☐ Onsite UTM : 47P 1514458 654247

Calibrated Date: 23 February 2023

Site : เอ็นไวแล็บ

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 44

Serial : 1807

Environment: Temperature 25 °C Humidity 56 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230, Bruel&Kjaer

Serial No.1351075

Date of Calibration : 21 March 2022

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.66	94.00	0.34	93.66

Calibrated By:

Date: 23 February 2023

Approve By:

Date: 23 February 2023

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Envilab & Noise Supply Instrument

Verification Test Report

Report No.:

SO2300038-E002 -SLM 06

☐ PM ☒ Onsite UTM : 47Q N 1808617 E 563423

Calibrated Date: 22 March 2023

Site : บ้านท้ายเกาะ

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0015

Environment: Temperature 30 °C Humidity 57 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230, Bruel&Kjaer

Serial No.1351075

Date of Calibration : 16 Mar 2023

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.78	93.70	-0.08	93.78

Calibrated By:

Date:

22 March 2023

Approve By:

Date:

22 March 2023

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Envilab & Naredat Supply Instrument

Verification Test Report

Report No.:

SO2300038-E002 -SLM 05

☐ PM ☒ Onsite UTM : 47Q N 1808303 E 564182

Calibrated Date: 22 March 2023

Site : บริเวณบ้านใหม่

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0016

Environment: Temperature 30 °C Humidity 57 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230, Bruel&Kjaer

Serial No.1351075

Date of Calibration : 16 Mar 2023

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.78	93.90	0.12	93.78

Calibrated By:

Date:

22 March 2023

Approve By:

Date:

22 March 2023

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Environmental responsibility

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Envilab & Needss Supply Instrument

Verification Test Report

Report No.:

SO2300038-E002 -SLM 01

☐ PM ☒ Onsite UTM : 47Q N 1808471 E 563729

Calibrated Date: 22 March 2023

Site : บริเวณริมรั้วโรงงานด้านทิศเหนือ

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0018

Environment: Temperature 30 °C Humidity 57 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230,Bruel&Kjaer

Serial No.1351075

Date of Calibration : 16 Mar 2023

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.78	93.90	0.12	93.78

Calibrated By:

Date:

22 March 2023

Approve By:

Date:

22 March 2023

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Envilab & Related Survey Instrument

Verification Test Report

Report No.:

SO2300038-E002 -SLM 02

☐ PM ☒ Onsite UTM : 47Q N 1808197 E 563680

Calibrated Date: 22 March 2023

Site : บริเวณริมรั้วโรงงานด้านทิศตะวันตก

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0027

Environment: Temperature 30 °C Humidity 57 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230,Bruel&Kjaer

Serial No.1351075

Date of Calibration : 16 Mar 2023

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.78	93.80	0.02	93.78

Calibrated By:

Date:

22 March 2023

Approve By:

Date:

22 March 2023

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Envilab & Needless Supply Instrument

Verification Test Report

Report No.:

SO2300038-E002 -SLM 03

☐ PM ☒ Onsite UTM : 47Q N 1808049 E 563983

Calibrated Date: 22 March 2023

Site : บริเวณริมรั้วโรงงานด้านทิศใต้

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0022

Environment: Temperature 30 °C Humidity 57 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230,Bruel&Kjaer

Serial No.1351075

Date of Calibration : 16 Mar 2023

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.78	93.90	0.12	93.78

Calibrated By:

Date:

22 March 2023

Approve By:

Date:

22 March 2023

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Environment responsibility with accuracy measurement

00:01/08/63

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Envilab & Needless Supply Instrument

Verification Test Report

Report No.:

SO2300038-E002 -SLM 04

☐ PM ☒ Onsite UTM : 47Q N 1808308 E 564096

Calibrated Date: 22 March 2023

Site : บริเวณริมรั้วโรงงานด้านทิศตะวันออก

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0024

Environment: Temperature 30 °C Humidity 57 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230,Bruel&Kjaer

Serial No.1351075

Date of Calibration : 16 Mar 2023

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.78	93.90	0.12	93.78

Calibrated By:

Date:

22 March 2023

Approve By:

Date:

22 March 2023

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Envilab & Mesolab Supply Instrument

Verification Test Report

Report No.:

SO2300039-E017 -PU 01

Calibrated Date: 22-Feb-23

Equipment: Air Sampling Pump

Manufacturer: Gillian

Model: Lin Eair 40

Serial or ID No. AB079

Environment: Temperature 25 °C Humidity 56 %RH

Reference Standard: Primary Flow Calibrator Model Defender 520 H, MESALABS

Serial No. 164578

Date of Calibration : 28 December 2022

Result of Test			
Reference Flow (ml/min)	Test No.	Reading (ml/min)	Average (ml/min)
28300	1	28301.4	28300.3
	2	28300.2	
	3	28300.1	
	4	28300.0	
	5	28300.0	

Calibrated By:

Date: 22-Feb-23

Approve By:

Date: 22-Feb-23

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Envilab & Needlab Supply Instrument

Verification Test Report

Report No.:

SO2300039-E017 -SLM 05

☒ PM

☐ Onsite UTM :

47P 1514458 N 654247 E

Calibrated Date: 23 February 2023

Site : บริษัท เอ็นไวแล็บ จำกัด

Equipment: Sound Level Meter

Manufacturer: QUEST

Model: DLX

Serial : 20053

Environment: Temperature 25 °C Humidity 75 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230, Bruel&Kjaer

Serial No.1351075

Date of Calibration : 21 March 2022

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.66	93.72	0.06	93.66

Calibrated By:

Date:

23 February 2023

Approve By:

Date:

23 February 2023



Envilab Co., Ltd.

บริษัท เอ็นไวแล็บ จำกัด
ผู้จัดการฝ่ายควบคุมคุณภาพ

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FE-MNT-27 Rev.00.01/08/63



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Envilab & Needing Supply Instrument

Verification Test Report

Report No.:

SO2300039-E017 -PU 01

Calibrated Date: 22-Feb-23

Equipment: Air Sampling Pump

Manufacturer: AP BUCK

Model: LP-5

Serial or ID No. 5576

Environment: Temperature 25 °C Humidity 60 %RH

Reference Standard: Primary Flow Calibrator Model Defender 520 H, MESALABS

Serial No. 164578

Date of Calibration : 28 December 2022

Result of Test			
Reference Flow (ml/min)	Test No.	Reading (ml/min)	Average (ml/min)
2000	1	1999.9	2000.3
	2	2001.1	
	3	2002.4	
	4	1997.4	
	5	2000.8	

Calibrated By:

Date: 22-Feb-23

Approve By:

Date: 22-Feb-23

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Verification Test Report

Report No.:

SO2300039-E017 -PU 02

Calibrated Date: 22-Feb-23

Equipment: Air Sampling Pump

Manufacturer: AP BUCK

Model: LP-5

Serial or ID No. 5611

Environment: Temperature 28 °C Humidity 60 %RH

Reference Standard: Primary Flow Calibrator Model Defender 520 H, MESALABS

Serial No. 164578

Date of Calibration : 28 December 2022

Result of Test			
Reference Flow (ml/min)	Test No.	Reading (ml/min)	Average (ml/min)
1700	1	1701.3	1700.8
	2	1697.5	
	3	1701.4	
	4	1702.6	
	5	1701.4	

Calibrated By:

Date: 22-Feb-23

Approve By:

Date: 22-Feb-23

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Envilab & Needles supply instrument

Verification Test Report

Report No.:

SO2300039-E017 -PU 03

Calibrated Date: 22-Feb-23

Equipment: Air Sampling Pump

Manufacturer: AP BUCK

Model: LP-5

Serial or ID No. 5612

Environment: Temperature 28 °C Humidity 60 %RH

Reference Standard: Primary Flow Calibrator Model Defender 520 H, MESALABS

Serial No. 164578

Date of Calibration : 28 December 2022

Result of Test			
Reference Flow (ml/min)	Test No.	Reading (ml/min)	Average (ml/min)
2000	1	2007.2	2002.6
	2	2002.6	
	3	2006.7	
	4	1995.8	
	5	2000.9	

Calibrated By:

Date: 22-Feb-23

Approve By:

Date: 22-Feb-23

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FE-WNT-28 Rev.01:11/01/65



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Envilab & Member Supply Instrument

Verification Test Report

Report No.:

SO2300039-E017 -PU 04

Calibrated Date: 22-Feb-23

Equipment: Air Sampling Pump

Manufacturer: AP BUCK

Model: LP-5

Serial or ID No. 5568

Environment: Temperature 28 °C Humidity 60 %RH

Reference Standard: Primary Flow Calibrator Model Defender 520 H, MESALABS

Serial No. 164578

Date of Calibration : 28 December 2022

Result of Test			
Reference Flow (ml/min)	Test No.	Reading (ml/min)	Average (ml/min)
1700	1	1703.5	1701.4
	2	1695.8	
	3	1705.6	
	4	1701.5	
	5	1700.8	

Calibrated By:

Date: 22-Feb-23

Approve By:

Date: 22-Feb-23

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Verification Test Report

Report No.:

SO2300039-E018 -PU 01

Calibrated Date: 28-Mar-23

Equipment: Air Sampling Pump

Manufacturer: AP BUCK

Model: LP-5

Serial or ID No. 4831

Environment: Temperature 25 °C Humidity 60 %RH

Reference Standard: Primary Flow Calibrator Model Defender 520 H, MESALABS

Serial No. 164578

Date of Calibration : 28 December 2022

Result of Test			
Reference Flow (ml/min)	Test No.	Reading (ml/min)	Average (ml/min)
2000	1	1998.2	1998.6
	2	1999.4	
	3	2000.7	
	4	1995.7	
	5	1999.1	

Calibrated By:

Date: 28-Mar-23

Approve By:

Date: 28-Mar-23

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Verification Test Report

Report No.:

SO2300039-E018 -PU 02

Calibrated Date: 28-Mar-23

Equipment: Air Sampling Pump

Manufacturer: AP BUCK

Model: LP-5

Serial or ID No. 4830

Environment: Temperature 28 °C Humidity 60 %RH

Reference Standard: Primary Flow Calibrator Model Defender 520 H, MESALABS

Serial No. 164578

Date of Calibration : 28 December 2022

Result of Test			
Reference Flow (ml/min)	Test No.	Reading (ml/min)	Average (ml/min)
1700	1	1698.1	1699.5
	2	1703.6	
	3	1698.2	
	4	1699.4	
	5	1698.2	

Calibrated By:

Date: 28-Mar-23

Approve By:

Date: 28-Mar-23

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Verification Test Report

Report No.:

SO2300039-E018 -PU 03

Calibrated Date: 28-Mar-23

Equipment: Air Sampling Pump

Manufacturer: AP BUCK

Model: LP-5

Serial or ID No. 4829

Environment: Temperature 28 °C Humidity 60 %RH

Reference Standard: Primary Flow Calibrator Model Defender 520 H, MESALABS

Serial No. 164578

Date of Calibration : 28 December 2022

Result of Test			
Reference Flow (ml/min)	Test No.	Reading (ml/min)	Average (ml/min)
2000	1	2005.5	2000.9
	2	2000.9	
	3	2005.0	
	4	1994.1	
	5	1999.2	

Calibrated By:

Date: 28-Mar-23

Approve By:

Date: 28-Mar-23

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Verification Test Report

Report No.:

SO2300039-E018 -PU 04

Calibrated Date: 28-Mar-23

Equipment: Air Sampling Pump

Manufacturer: AP BUCK

Model: LP-5

Serial or ID No. 4832

Environment: Temperature 28 °C Humidity 60 %RH

Reference Standard: Primary Flow Calibrator Model Defender 520 H, MESALABS

Serial No. 164578

Date of Calibration : 28 December 2022

Result of Test			
Reference Flow (ml/min)	Test No.	Reading (ml/min)	Average (ml/min)
1700	1	1702.4	1700.3
	2	1694.7	
	3	1704.5	
	4	1700.4	
	5	1699.7	

Calibrated By:

Date: 28-Mar-23

Approve By:

Date: 28-Mar-23

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Verification Test Report

Report No.:

SO2300039-E018 -SLM 01

☒ PM ☐ Onsite UTM : 47P 1514458 654247

Calibrated Date: 27 March 2023

Site : เอ็นไวแล็บ

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 44

Serial : 1883

Environment: Temperature 25 °C Humidity 56 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230,Brue&Kjaer

Serial No.1351075

Date of Calibration : 21 March 2022

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.66	94.00	0.34	93.66

Calibrated By:

Date:

27 March 2023

Approve By:

Date:

27 March 2023

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Envilab Co., Limited Supply Instrument

Verification Test Report

Report No.:

SO2300039-E018 -SLM 01

☒ PM ☐ Onsite UTM : 47P 1514458 N 654247 E

Calibrated Date: 27 March 2023

Site : บริษัท เอ็นไวแล็บ จำกัด

Equipment: Sound Level Meter

Manufacturer: QUEST

Model: DLX

Serial : 20104

Environment: Temperature 25 °C Humidity 75 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230,Brue&Kjaer

Serial No.1351075

Date of Calibration : 21 March 2022

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.66	93.74	0.08	93.66

Calibrated By:

Date:

27 March 2023

Approve By:

Date:

27 March 2023

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SO2 Analyzer Verification Test Report

Calibration Report No.: AP-S6602004

Calibrated Date: 1-Feb-23

☒ PM ☐ Onsite

Instruments Information

Page:1/2

Analyzer Type: SO2 Analyzer Model: 100A	Manufacturer: API S/N: ESOAI100A01175
--	--

Calibration System

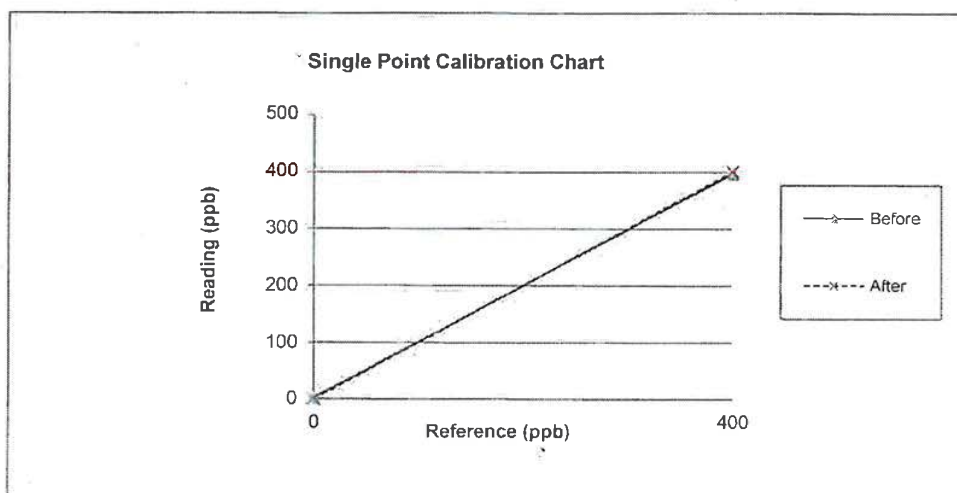
Calibrator Unit	Standard Gas
Dilutor Model: ESA MGC101 S/N: 792 ZERO AIR Generator: ZAG7001 S/N: 644	NO Conc: 44.68 PPM SO2 Conc: 45.34 PPM CO Conc: 4500 PPM Expire Date: Feb 19, 2024 EB0140762

Environment: Temperature 25.1 °C

Humidity: 58 %RH

Calibration Report

Status	Zero			Span		
	Reference (ppb)	Reading (ppb)	Drift (ppb)	Reference (ppb)	Reading (ppb)	Drift%
Before	0.0	3.0	3.0	400.0	397.0	-0.4
After	0.0	0.4	0.4	400.0	400.9	0.1





บริษัท นีดีส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.

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Tel. 02-802-3980-2 Fax. 02-802-3985 E: info@neediss.com



SO2 Analyzer Verification Test Report

Calibration Report No.: AP-S6602004

Calibrated Date: 1-Feb-23

☒ PM ☐ Onsite

Page: 2/2

Test Function Value	Nominal range	Unit	Before	After	Note
Date	1-Feb-23				
Time	13:10				
Range	50 - 20000	PPB	500	500	
Stability (Zero Gas)	< 0.2	PPB	0.6	0.2	
Sample Flow	650 (+/- 50)	cc/min	663	659	
PMT Detector	0 - 5000	mV	36.5	34.5	
Norm PMT Detector	0 - 5000	mV	34.1	32.8	
HVPS	400-900 constant	V	719	648	
DCPS	2500 (+/- 200)	mV	-	-	
RCELL TEMP	50 (+/- 1)	Degree C	50	50	
BOX TEMP	20-40	Degree C	34.1	32.7	
PMT TEMP	7 (+/- 1)	Degree C	8.0	8.0	
UV lamp	1000-4900	mV	4034.0	4034.0	
Lamp Ratio	30-120	%	114.0	114.0	
STR. Light (Zero Gas)	<100	PPB	29	29	
Dark PMT	(-50) - (+200)	mV	44.7	44.7	
Dark lamp	(-50) - (+200)	mV	5.1	5.1	
SAMP PRES	20-30 constant	IN-Hg-A	28.1	27.8	
Electric Test/Optic Test					
PMT Volts	2000 (+/- 500)	mV	2004	2020	
SO2 Cono	1000 (+/- 250)	PPB	1002	1010	
SO2 Slope	1 (+/- 0.3)	-	0.920	0.866	
SO2 Offset	< 250	mV	65	130.1	
Stability at Zero	< 0.2	PPB	0.1	0.1	
Stability at Span	< 2 ppb @ 400 ppb	PPB	0.6	0.2	
Gas Test Response					
Zero Gas (0,00 PPB)	0	ppb	3.0	0.4	
Span Gas (400 PPB)	400	ppb	397.0	400.9	± 5% of Range

Calibrate By :

Approve By :

Date:

1-Feb-23

Date:

1-Feb-23

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SO2 Analyzer Verification Test Report

Calibration Report No.: AP-S6602003

Calibrated Date: 1-Feb-23

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Instruments Information

Page:1/2

Analyzer Type: SO2 Analyzer Model: T100	Manufacturer API S/N: ESOAIT10002035
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Calibration System

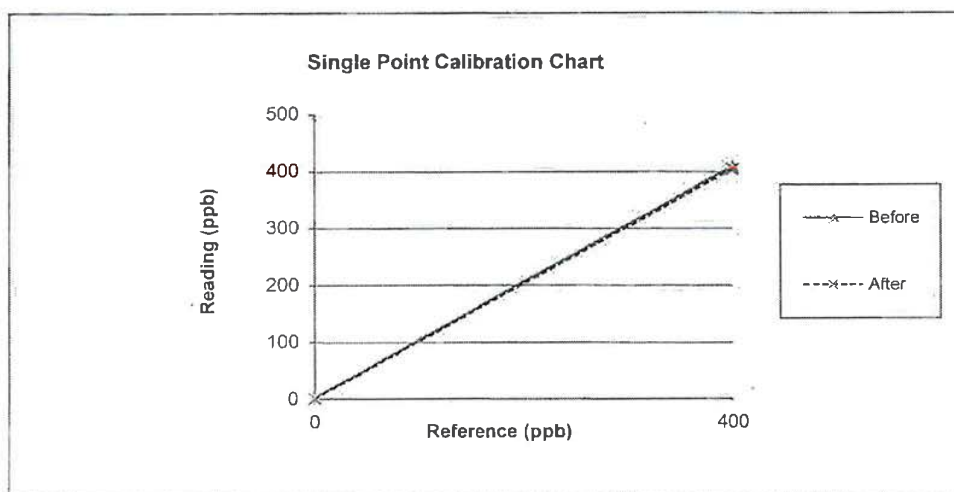
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 25.1 °C

Humidity: 59 %RH

Calibration Report

Status	Zero			Span		
	Reference (ppb)	Reading (ppb)	Drift (ppb)	Reference (ppb)	Reading (ppb)	Drift%
Before	0.0	3.8	3.8	400.0	409.0	1.1
After	0.0	1.1	1.1	400.0	404.2	0.5



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SO2 Analyzer Verification Test Report

Calibration Report No.: AP-S6602003

Calibrated Date: 1-Feb-23

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Page: 2/2

Test Function Value	Nominal range	Unit	Before	After	Note
Date	1-Feb-23				
Time	16:40				
Range	50 - 20000	PPB	500	500	
Stability (Zero Gas)	< 0.2	PPB	0.6	0.3	
Sample Flow	650 (+/- 50)	cc/min	666	650	
PMT Detector	0 - 5000	mV	27.4	32.5	
Norm PMT Detector	0 - 5000	mV	30.4	41.7	
HVPS	400-900 constant	V	674	679	
DCPS	2500 (+/- 200)	mV	-	-	
RCELL TEMP	50 (+/- 1)	Degree C	50	50	
BOX TEMP	20-40	Degree C	33.6	32.8	
PMT TEMP	7 (+/-1)	Degree C	7.9	7.9	
UV lamp	1000-4900	mV	3020	3022	
Lamp Ratio	30-120	%	96.3	96.3	
STR. Light (Zero Gas)	<100	PPB	20.2	20.0	
Dark PMT	(-50) - (+200)	mV	164.5	164.5	
Dark lamp	(-50) - (+200)	mV	3.4	3.4	
SAMP PRES	20-30 constant	IN-Hg-A	28.0	27.4	
Electric Test/Optic Test					
PMT Volts	2000 (+/- 500)	mV	2014.0	2024.0	
SO2 Conc	1000 (+/- 250)	PPB	1007.0	1012.0	
SO2 Slope	1 (+/- 0.3)	-	1.000	1.011	
SO2 Offset	< 250	mV	44.3	38.5	
Stability at Zero	< 0.2	PPB	0.1	0.1	
Stability at Span	< 2 ppb @ 400 ppb	PPB	0.6	0.3	
Gas Test Response					
Zero Gas (0.00 PPB)	0	ppb	3.8	1.1	
Span Gas (400 PPB)	400	ppb	409.0	404.2	± 5% of Range

Calibrate By: _____

Date:

1-Feb-23

Approve By: _____

Date:

1-Feb-23

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รับรองสำเนาถูกต้อง

EnviroLab Co., Ltd.

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SO2 Analyzer Verification Test Report

Calibration Report No.: AP-S6602001

Calibrated Date: 1-Feb-23

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Instruments Information

Page:1/2

Analyzer Type: SO2 Analyzer Model: T100	Manufacturer API S/N: ESOAIT10002034
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Calibration System

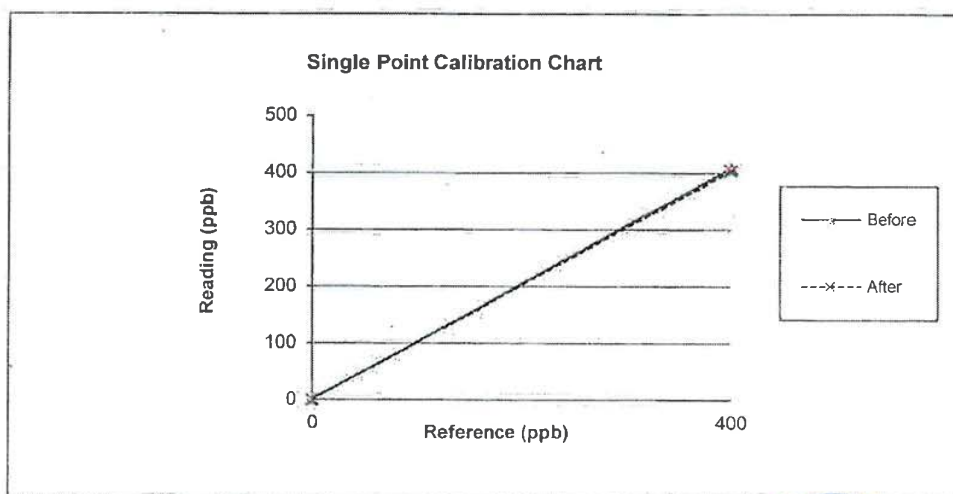
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 25.1 °C

Humidity: 61 %RH

Calibration Report

Status	Zero			Span		
	Reference (ppb)	Reading (ppb)	Drift (ppb)	Reference (ppb)	Reading (ppb)	Drift%
Before	0.0	1.2	1.2	400.0	408.0	1.0
After	0.0	0.6	0.6	400.0	403.0	0.4



รับรองสำเนาถูกต้อง

EnviLab Co., Ltd.

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SO2 Analyzer Verification Test Report

Calibration Report No.: AP-S6602001

Calibrated Date: 1-Feb-23

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Page:2/2

Test Function Value	Nominal range	Unit	Before	After	Note
Date	1-Feb-23				
Time	11:50				
Range	50 - 20000	PPB	500	500	
Stability (Zero Gas)	< 0.2	PPB	0.5	0.2	
Sample Flow	650 (+/- 50)	cc/min	650	619	
PMT Detector	0 - 5000	mV	34.7	26.4	
Norm PMT Detector	0 - 5000	mV	44.0	25.9	
HVPS	400-900 constant	V	723	723	
DCPS	2500 (+/- 200)	mV	-	-	
RCELL TEMP	50 (+/- 1)	Degree C	50	50	
BOX TEMP	20-40	Degree C	35.5	33.9	
PMT TEMP	7 (+/-1)	Degree C	8.0	8.0	
UV lamp	1000-4900	mV	2132.0	2132.0	
Lamp Ratio	30-120	%	114.0	114.0	
STR. Light (Zero Gas)	<100	PPB	19	19	
Dark PMT	(-50) - (+200)	mV	64.5	64.5	
Dark lamp	(-50) - (+200)	mV	-15.1	-15.1	
SAMP PRES	20-30 constant	IN-Hg-A	27.4	27.8	
Electric Test/Optic Test					
PMT Volts	2000 (+/- 500)	mV	2012	2008	
SO2 Curve	1000 (+/- 250)	PPB	1006	1004	
SO2 Slope	1 (+/- 0.3)	-	0.959	0.959	
SO2 Offset	< 250	mV	30.3	1	
Stability at Zero	< 0.2	PPB	0.1	17.7	
Stability at Span	< 2 ppb @ 400 ppb	PPB	0.5	0.2	
Gas Test Response					
Zero Gas (0.00 PPB)	0	ppb	1.2	0.6	
Span Gas (400 PPB)	400	ppb	408.0	403.0	± 5% of Range

Calibrate By :

Date:

1-Feb-23

Approve By :

Date:

1-Feb-23

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SO2 Analyzer Verification Test Report

Calibration Report No.: AP-S6602002

Calibrated Date: 1-Feb-23

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Instruments Information

Page:1/2

Analyzer Type: SO2 Analyzer Model: 100A	Manufacturer API S/N: NSOAI100A00632
--	---

Calibration System

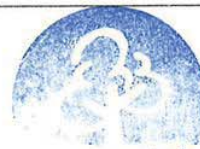
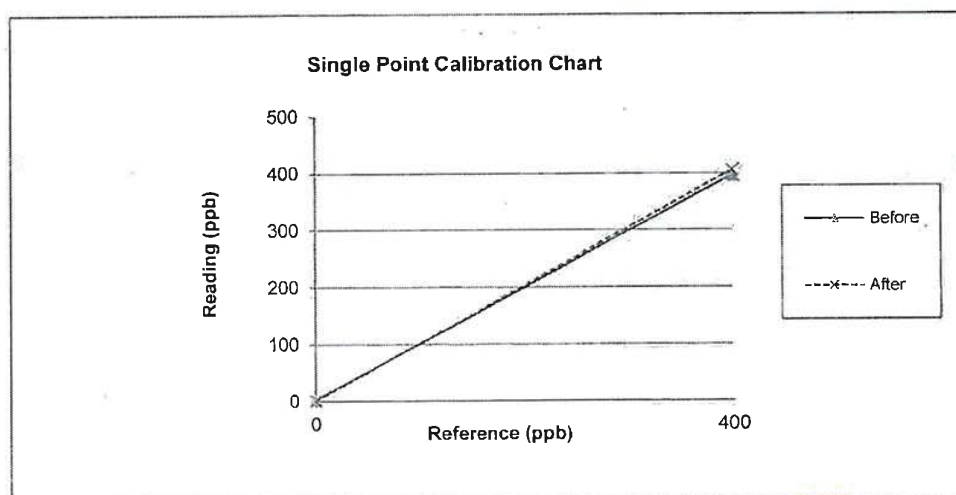
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 25.1 °C

Humidity: 60 %RH

Calibration Report

Status	Zero			Span		
	Reference (ppb)	Reading (ppb)	Drift (ppb)	Reference (ppb)	Reading (ppb)	Drift%
Before	0.0	2.6	2.6	400.0	396.1	-0.5
After	0.0	0.7	0.7	400.0	405.2	0.6



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SO2 Analyzer Verification Test Report

Calibration Report No.: AP-S6602002

Calibrated Date: 1-Feb-23

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Page:2/2

Test Function Value	Nominal range	Unit	Before	After	Note
Date	1-Feb-23				
Time	13:10				
Range	50 - 20000	PPB	500	500	
Stability (Zero Gas)	< 0.2	PPB	0.6	0.2	
Sample Flow	650 (+/- 50)	cc/min	663	659	
PMT Detector	0 - 5000	mV	36.5	34.5	
Norm PMT Detector	0 - 5000	mV	34.1	32.8	
HVPS	400-900 constant	V	719	648	
DCPS	2500 (+/- 200)	mV	-	-	
RCELL TEMP	50 (+/- 1)	Dreegee C	50	50	
BOX TEMP	20-40	Dreegee C	34.1	32.7	
PMT TEMP	7 (+/- 1)	Dreegee C	8.0	8.0	
UV lamp	1000-4900	mV	4034.0	4034.0	
Lamp Ratio	30-120	%	114.0	114.0	
STR., Light (Zero Gas)	<100	PPB	29	29	
Dark PMT	(-50) - (+200)	mV	44.7	44.7	
Dark lamp	(-50) - (+200)	mV	5.1	5.1	
SAMP PRES	20-30 contant	IN-Hg-A	28.1	27.8	
Electric Test/Optic Test					
PMT Volts	2000 (+/- 500)	mV	2004	2020	
SO2 Conc	1000 (+/- 250)	PPB	1002	1010	
SO2 Slope	1 (+/- 0.3)	-	0.920	0.866	
SO2 Offset	< 250	mV	65	130.1	
Stability at Zero	< 0.2	PPB	0.1	0.1	
Stability at Span	< 2 ppb @ 400 ppb	PPB	0.6	0.2	
Gas Test Response					
Zero Gas (0.00 PPB)	0	ppb	2.6	0.7	
Span Gas (400 PPB)	400	ppb	396.1	405.2	± 5% of Range

Calibrate By :



Date:

1-Feb-23

Approve By :



Date:

1-Feb-23

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NOx Analyzer Verification Test Report

Calibration Report No.: AP-N6602005

Page:1/1

Calibrated Date: 1-Feb-23

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Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 200E	Manufacturer: API S/N: ENOAI200E01526
---	--

Calibration System

Calibrator Unit	Standard Gas
Dilutor Model: ESA MGC101 S/N: 792 ZERO AIR Generator: ZAG7001 S/N: 644	NO Conc: 44.68 PPM SO2 Conc: 45.34 PPM CO Conc: 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 25.4 °C

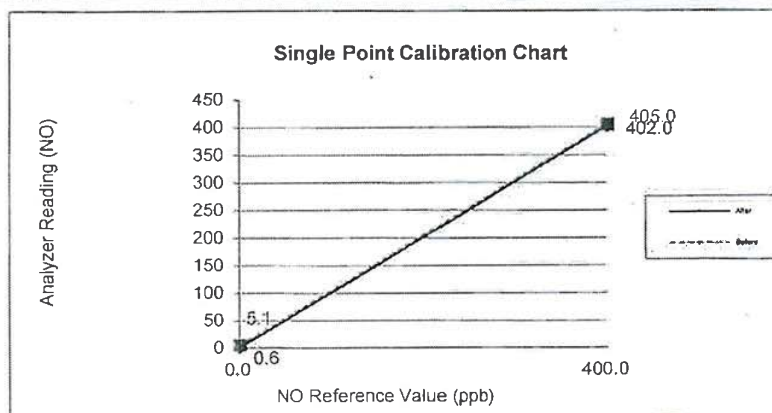
Humidity: 64 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	3.8	0.0	3.8	396.0	400.0	-0.5
NO ₂	1.3	0.0	1.3	9.0	0.0	1.1
NOx	5.1	0.0	5.1	405.0	400.0	0.6

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.3	0.0	0.3	402.0	400.0	0.2
NO ₂	0.3	0.0	0.3	0.0	0.0	0.0
NOx	0.6	0.0	0.6	402.0	400.0	0.2





NOx Analyzer Verification Test Report

Calibration Report No.: AP-N6602005

Page:1/1

Calibrated Date: 1-Feb-23

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Page:2/2

Test Function Value	Normal range	Unit	Before	After	Note
Date	1-Feb-23				
Time	15:30				
Range	0.00 - 500.00 PPB	PPB	500.0	500.0	
Stability (Zero Gas)	< 0.2	PPB	0.8	0.2	
Sample Flow	500 +/- 50	cc/min	470.0	476.0	
Ozone Flow	60-90	cc/min	90.0	76.0	
PMT Detector	0-5000	mV	24.8	19.6	
AZERO	-20-150	mV	11.7	7.3	
HVPS	400-900 constant	V	768.0	714.0	
DCPS	2500 +/- 200	mV	-	-	
RCELL TEMP	50 +/- 1	Dreegee C	50.3	50.3	
BOX TEMP	20-35	Dreegee C	28.0	27.5	
PMT TEMP	7 +/- 1	Dreegee C	7.7	7.8	
IZS TEMP	50 +/- 4	Dreegee C	-	-	
MOLY Temp	315 +/- 5	Dreegee C	313.1	315.0	
RCEL PRES	4-10 contant	IN-Hg-A	7.30	7.30	
SAMP PRES	20-30 contant	IN-Hg-A	31.4	31.3	
NO Slope	1 +/- 0.3		0.647	0.963	
Nox Slope	1 +/- 0.3		0.652	0.940	
NO Offset	-10 to + 150	mV	17.40	6.60	
NOx Offset	-10 to + 150	mV	24.10	12.70	
Span and Cal Values					
Zero Value	NO	0	ppb	3.8	0.3
	NOx	0	ppb	5.1	0.6
Span Value	NO	400	ppb	396.0	402.0
	NOx	400	ppb	405.0	402.0

Calibrate By :

Date:

1-Feb-23

Approve By :

Date:

1-Feb-23


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NOx Analyzer Verification Test Report

Calibration Report No.: AP-N6602006

Page:1/1

Calibrated Date: 1-Feb-23

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Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 200A	Manufacturer API S/N: ENOAI200E01170
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Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 25.4 °C

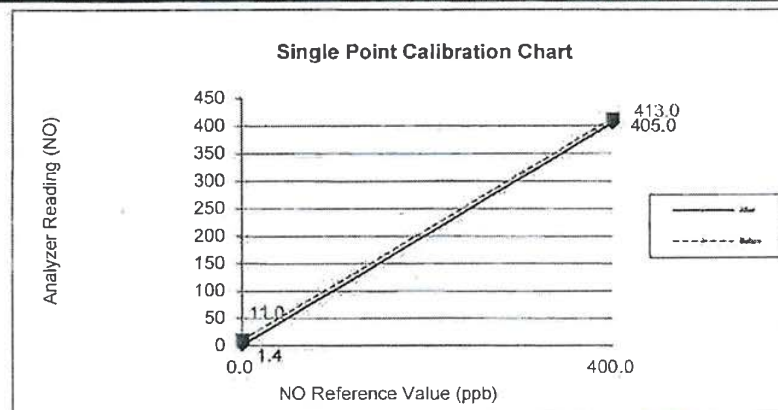
Humidity: 62 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	7.4	0.0	7.4	410.0	400.0	1.2
NO ₂	3.6	0.0	3.6	3.0	0.0	0.4
NOx	11.0	0.0	11.0	413.0	400.0	1.6

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.6	0.0	0.6	402.0	400.0	0.2
NO ₂	0.8	0.0	0.8	3.0	0.0	0.4
NOx	1.4	0.0	1.4	405.0	400.0	0.6





NOx Analyzer Verification Test Report

Calibration Report No.: AP-N6602006

Page:1/1

Calibrated Date: 1-Feb-23

☒ PM ☐ Onsite

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Test Function Value	Normal range	Unit	Before	After	Note
Date	1-Feb-23				
Time	15:30				
Range	0.00 - 500.00 PPB	PPB	500.0	500.0	
Stability (Zero Gas)	< 0.2	PPB	0.8	0.2	
Sample Flow	500 +/- 50	cc/min	470.0	476.0	
Ozone Flow	60-90	cc/min	90.0	76.0	
PMT Detector	0-5000	mV	24.8	19.6	
AZERO	-20-150	mV	11.7	7.3	
HVPS	400-900 constant	V	768.0	714.0	
DCPS	2500 +/- 200	mV			
RCELL TEMP	50 +/- 1	Dreegee C	50.3	50.3	
BOX TEMP	20-35	Dreegee C	28.0	27.5	
PMT TEMP	7 +/- 1	Dreegee C	7.7	7.8	
IZS TEMP	50 +/- 4	Dreegee C			
MOLY Temp	315 +/- 5	Dreegee C	313.1	315.0	
RCEL PRES	4-10 contant	IN-Hg-A	7.30	7.30	
SAMP PRES	20 30 contant	IN-Hg-A	31.4	31.3	
NO Slope	1 +/- 0.3		0.647	0.963	
Nox Slope	1 +/- 0.3		0.652	0.940	
NO Offset	-10 to + 150	mV	17.40	6.60	
NOx Offset	-10 to + 150	mV	24.10	12.70	
Span and Cal Values					
Zero Value	NO	0	ppb	7.4	0.6
	NOx	0	ppb	11.0	1.4
Span Value	NO	400	ppb	410.0	402.0
	NOx	400	ppb	413.0	405.0

Calibrate By :

Date:

1-Feb-23

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Date:

1-Feb-23



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Neediss Supply Instrument Co., Ltd.

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NOx Analyzer Verification Test Report

Calibration Report No.: AP-N6602007

Page:1/1

Calibrated Date: 1-Feb-23



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Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: T200	Manufacturer API S/N: ENOAIT20003573
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Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 25.4 °C

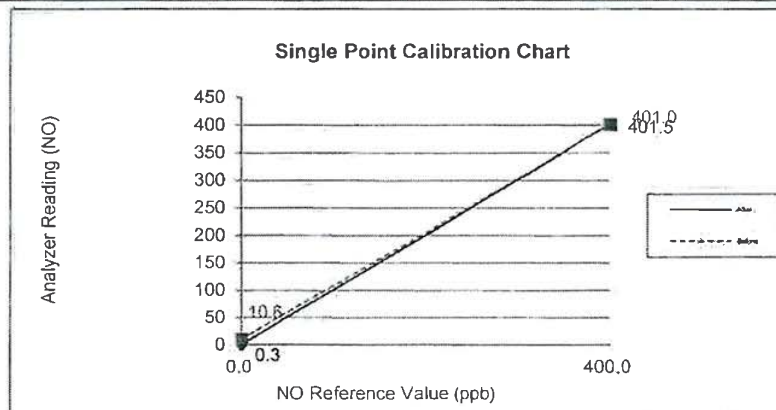
Humidity: 61 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	8.3	0.0	8.3	388.0	400.0	-1.5
NO ₂	2.3	0.0	2.3	13.0	0.0	1.6
NOx	10.6	0.0	10.6	401.0	400.0	0.1

Calibration Check (After 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	400.4	400.0	0.0
NO ₂	0.2	0.0	0.2	1.1	0.0	0.1
NOx	0.3	0.0	0.3	401.5	400.0	0.2



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NOx Analyzer Verification Test Report

Calibration Report No.: AP-N6602007

Page:1/1

Calibrated Date: 1-Feb-23



PM



Onsite

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Test Function Value	Normal range	Unit	Before	After	Note
Date	1-Feb-23				
Time	9:25				
Range	0.00 - 500.00 PPB	PPB	500	500	
Stability (Zero Gas)	< 0.2	PPB	0.5	0.2	
Sample Flow	500 +/- 50	cc/min	491	485	
Ozone Flow	60-90	cc/min	80	80	
PMT Detector	0-5000	mV	85.0	25.0	
AZERO	-20-150	mV	94.1	14.5	
HVPS	400-900 constant	V	734	734	
DCPS	2500 +/- 200	mV	-	-	
RCELL TEMP	50 +/- 1	Degree C	50	50	
BOX TEMP	20-35	Degree C	34.7	33.6	
PMT TEMP	7 +/- 1	Degree C	7.0	7.0	
IZS TEMP	50 +/- 4	Degree C	-	-	
MOLY Temp	315 +/- 5	Degree C	314.0	314.0	
RCEL PRES	4-10 contant	IN-Hg-A	5.0	5.0	
SAMP PRES	20 30 contant	IN-Hg-A	28.8	27.9	
NO Slope	1 +/- 0.3		1.135	1.197	
Nox Slope	1 +/- 0.3		1.260	1.114	
NO Offset	-10 to + 150	mV	0.8	-3.6	
NOx Offset	-10 to + 150	mV	-2.6	6.1	
Span and Cal Values					
Zero Value	NO	0	ppb	8.3	0.1
	NOx	0	ppb	10.6	0.3
Span Value	NO	400	ppb	388.0	400.4
	NOx	400	ppb	401.0	401.5

Calibrate By:

Date:

1-Feb-23

Approve By:

Date:

1-Feb-23

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NOx Analyzer Verification Test Report

Calibration Report No.: AP-N6602009

Page: 1/1

Calibrated Date: 1-Feb-23



PM



Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: T200	Manufacturer API S/N: ENOAIT20000108
---	---

Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19, 2024 EB0140762

Environment: Temperature 25.5 °C

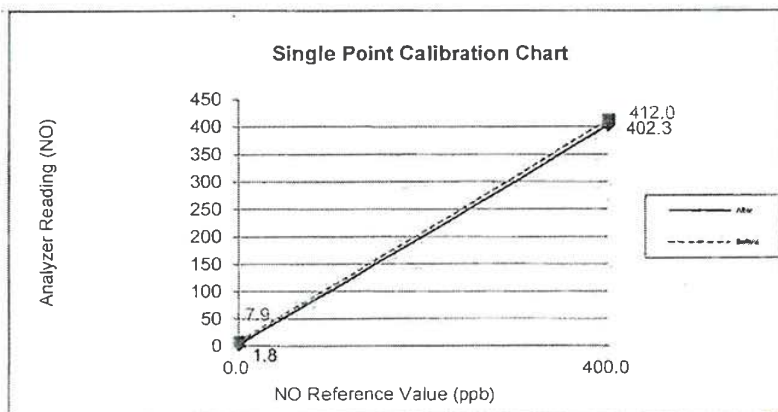
Humidity: 64 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	5.1	0.0	5.1	409.0	400.0	1.1
NO ₂	2.8	0.0	2.8	3.0	0.0	0.4
NOx	7.9	0.0	7.9	412.0	400.0	1.5

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	1.3	0.0	1.3	401.7	400.0	0.2
NO ₂	0.5	0.0	0.5	0.6	0.0	0.1
NOx	1.8	0.0	1.8	402.3	400.0	0.3



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NOx Analyzer Verification Test Report

Calibration Report No.: AP-N6602009

Page:1/1

Calibrated Date: 1-Feb-23



PM



Onsite

Page:2/2

Test Function Value	Normal range	Unit	Before	After	Note
Date	1-Feb-23				
Time	10:10				
Range	0.00 - 500.00 PPB	PPB	500	500	
Stability (Zero Gas)	< 0.2	PPB	0.5	0.2	
Sample Flow	500+/- 50	cc/min	511	532	
Ozone Flow	60-90	cc/min	80	80	
PMT Detector	0-5000	mV	27.4	16.4	
AZERO	-20-150	mV	54.2	54.2	
HVPS	400-900 constant	V	819	819	
DCPS	2500 +/- 200	mV	-	-	
RCELL TEMP	50+/- 1	Degree C	50	50	
BOX TEMP	20-35	Degree C	33.7	32.9	
PMT TEMP	7 +/-1	Degree C	7.1	7.1	
IZS TEMP	50+/- 4	Degree C	-	-	
MOLY Temp	315 +/- 5	Degree C	314.4	315.0	
RCEL PRES	4-10 constant	IN-Hg-A	10	10	
SAMP PRES	20-30 constant	IN-Hg-A	29.0	29.1	
NO Slope	1 +/- 0.3		0.820	0.801	
Nox Slope	1 +/- 0.3		0.848	0.813	
NO Offset	-10 to + 150	mV	10.2	15.3	
NOx Offset	-10 to + 150	mV	-2.0	-3.4	
Span and Cal Values					
Zero Value	NO	0	ppb	5.1	1.3
	NOx	0	ppb	7.9	1.8
Span Value	NO	400	ppb	409.0	401.7
	NOx	400	ppb	412.0	402.3

Calibrate By :

Date:

1-Feb-23

Approve By :

Date:

1-Feb-23

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SO2 Analyzer Verification Test Report

Calibration Report No.: AP-S6603003

Calibrated Date: 1-Mar-23

☒ PM ☐ Onsite

Instruments Information

Page:1/2

Analyzer Type: SO2 Analyzer Model: 100A	Manufacturer API S/N: ESOAI100A01175
--	---

Calibration System

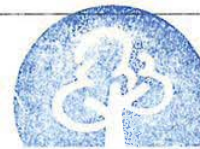
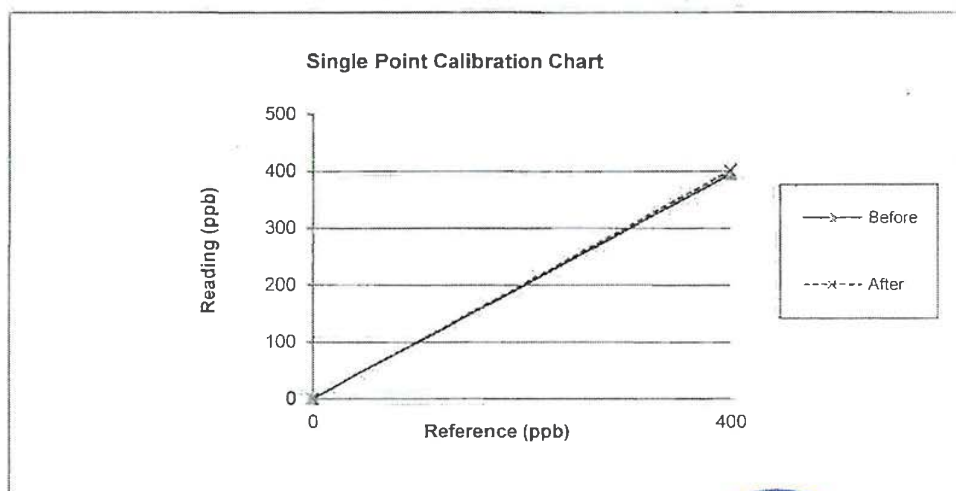
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 25.5 °C

Humidity: 59 %RH

Calibration Report

Status	Zero			Span		
	Reference (ppb)	Reading (ppb)	Drift (ppb)	Reference (ppb)	Reading (ppb)	Drift%
Before	0.0	0.7	0.7	400.0	395.0	-0.6
After	0.0	0.2	0.2	400.0	401.7	0.2



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SO2 Analyzer Verification Test Report

Calibration Report No.: AP-S6603003

Calibrated Date: 1-Mar-23

☒ PM ☐ Onsite

Page:2/2

Test Function Value	Nominal range	Unit	Before	After	Note
Date	1-Mar-23				
Time	13:10				
Range	50 - 20000	PPB	500	500	
Stability (Zero Gas)	< 0.2	PPB	0.6	0.2	
Sample Flow	650 (+/- 50)	cc/min	663	659	
PMT Detector	0 - 5000	mV	36.5	34.5	
Norm PMT Detector	0 - 5000	mV	34.1	32.8	
HVPS	400-900 constant	V	719	648	
DCPS	2500 (+/- 200)	mV	-	-	
RCELL TEMP	50 (+/- 1)	Dreegee C	50	50	
BOX TEMP	20-40	Dreegee C	34.1	32.7	
PMT TEMP	7 (+/-1)	Dreegee C	8.0	8.0	
UV lamp	1000-4900	mV	4034.0	4034.0	
Lamp Ratio	30-120	%	114.0	114.0	
STR. Light (Zero Gas)	<100	PPB	29	29	
Dark PMT	(-50) - (+200)	mV	44.7	44.7	
Dark lamp	(-50) - (+200)	mV	5.1	5.1	
SAMP PRES	20-30 constant	IN-Hg-A	28.1	27.8	
Electric Test/Optic Test					
PMT Volts	2000 (+/- 500)	mV	2004	2020	
SO2 Conc	1000 (+/- 250)	PPB	1002	1010	
SO2 Slope	1 (+/- 0.3)	-	0.920	0.866	
SO2 Offset	< 250	mV	65	130.1	
Stability at Zero	< 0.2	PPB	0.1	0.1	
Stability at Span	< 2 ppb @ 400 ppb	PPB	0.6	0.2	
Gas Test Response					
Zero Gas (0.00 PPB)	0	ppb	0.7	0.2	
Span Gas (400 PPB)	400	ppb	395.0	401.7	± 5% of Range

Calibrate By

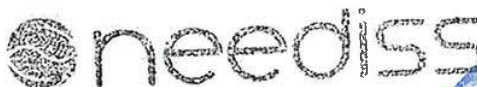
Date:

1-Mar-23

Approve By :

Date:

1-Mar-23



Neediss Supply Instrument Co., Ltd.



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SO2 Analyzer Verification Test Report

Calibration Report No.: AP-S6603006

Calibrated Date: 1-Mar-23

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Instruments Information

Page:1/2

Analyzer Type: SO2 Analyzer Model: 100E	Manufacturer API S/N: ESOAI100E01225
--	---

Calibration System

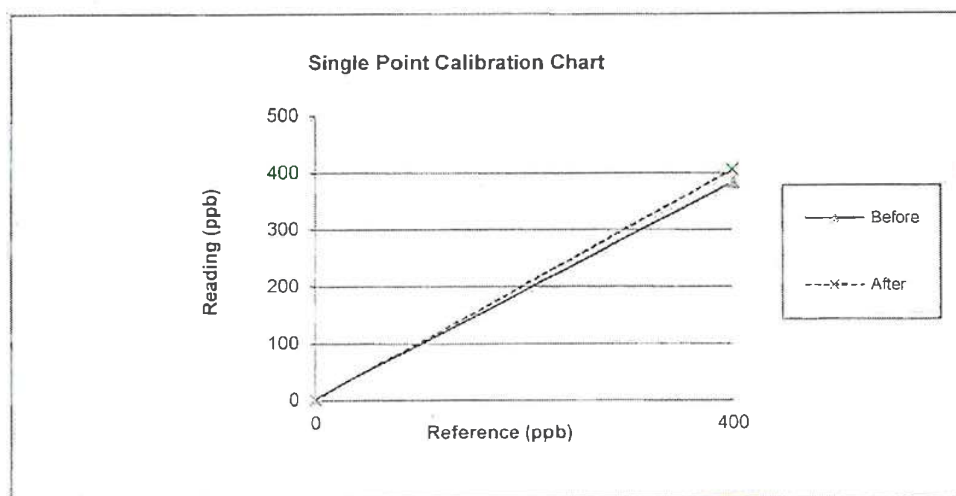
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 26.7 °C

Humidity: 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (ppb)	Reading (ppb)	Drift (ppb)	Reference (ppb)	Reading (ppb)	Drift%
Before	0.0	3.8	3.8	400.0	383.0	-2.2
After	0.0	1.6	1.6	400.0	405.0	0.6



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SO2 Analyzer Verification Test Report

Calibration Report No.: AP-S6603006

Calibrated Date: 1-Mar-23

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Page: 2/2

Test Function Value	Nominal range	Unit	Before	After	Note
Date	1-Mar-23				
Time	13:10				
Range	50 - 20000	PPB	500	500	
Stability (Zero Gas)	< 0.2	PPB	0.6	0.2	
Sample Flow	650 (+/- 50)	cc/min	663	659	
PMT Detector	0 - 5000	mV	36.5	34.5	
Norm PMT Detector	0 - 5000	mV	34.1	32.8	
HVPS	400-900 constant	V	719	648	
DCPS	2500 (+/- 200)	mV	-	-	
RCELL TEMP	50 (+/- 1)	Dreegee C	50	50	
BOX TEMP	20-40	Dreegee C	34.1	32.7	
PMT TEMP	7 (+/-1)	Dreegee C	8.0	8.0	
UV lamp	1000-4900	mV	4034.0	4034.0	
Lamp Ratio	30-120	%	114.0	114.0	
STR. Light (Zero Gas)	<100	PPB	29	29	
Dark PMT	(-50) - (+200)	mV	44.7	44.7	
Dark lamp	(-50) - (+200)	mV	5.1	5.1	
SAMP PRES	20-30 constant	IN-Hg-A	28.1	27.8	
Electric Test/Optic Test					
PMT Volts	2000 (+/- 500)	mV	2004	2020	
SO2 Conc	1000 (+/- 250)	PPB	1002	1010	
SO2 Slope	1 (+/- 0.3)	-	0.920	0.866	
SO2 Offset	< 250	mV	65	130.1	
Stability at Zero	< 0.2	PPB	0.1	0.1	
Stability at Span	< 2 ppb @ 400 ppb	PPB	0.6	0.2	
Gas Test Response					
Zero Gas (0.00 PPB)	0	ppb	3.8	1.6	
Span Gas (400 PPB)	400	ppb	383.0	405.0	± 5% of Range

Calibrate By: _____

Date:

1-Mar-23

Approve By: _____

Date:

1-Mar-23

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SO2 Analyzer Verification Test Report

Calibration Report No.: AP-S6603007

Calibrated Date: 1-Mar-23

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Instruments Information

Page: 1/2

Analyzer Type: SO2 Analyzer Model: T100	Manufacturer API S/N: ESOAIT10002032
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Calibration System

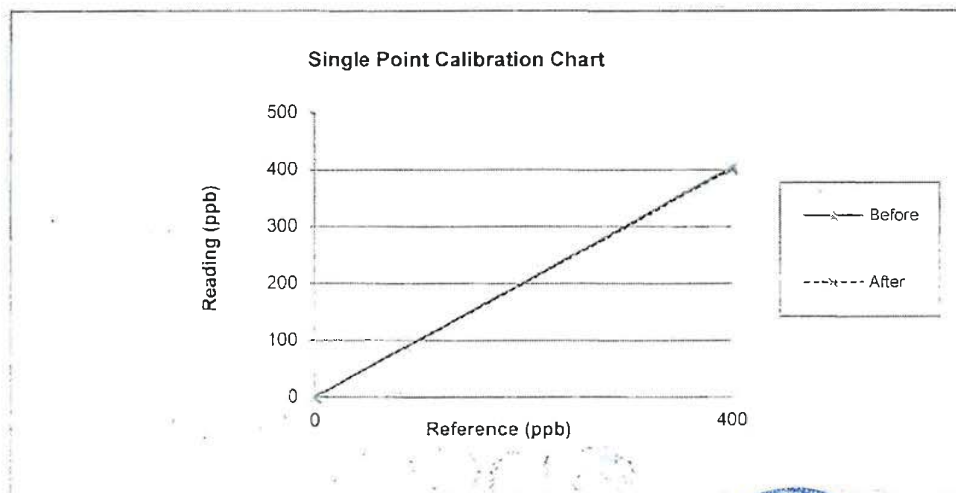
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 27.0 °C

Humidity: 59 %RH

Calibration Report

Status	Zero			Span		
	Reference (ppb)	Reading (ppb)	Drift (ppb)	Reference (ppb)	Reading (ppb)	Drift%
Before	0.0	1.3	1.3	400.0	405.0	0.6
After	0.0	0.2	0.2	400.0	401.0	0.1



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SO2 Analyzer Verification Test Report

Calibration Report No.: AP-S6603007

Calibrated Date: 1-Mar-23

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Page: 2/2

Test Function Value	Nominal range	Unit	Before	After	Note
Date	1-Mar-23				
Time	13:10				
Range	50 - 20000	PPB	500	500	
Stability (Zero Gas)	< 0.2	PPB	0.6	0.2	
Sample Flow	650 (+/- 50)	cc/min	663	659	
PMT Detector	0 - 5000	mV	36.5	34.5	
Norm PMT Detector	0 - 5000	mV	34.1	32.8	
HVPS	400-900 constant	V	719	648	
DCPS	2500 (+/- 200)	mV	-	-	
RCELL TEMP	50 (+/- 1)	Dreegee C	50	50	
BOX TEMP	20-40	Dreegee C	34.1	32.7	
PMT TEMP	7 (+/-1)	Dreegee C	8.0	8.0	
UV lamp	1000-4900	mV	4034.0	4034.0	
Lamp Ratio	30-120	%	114.0	114.0	
STR. Light (Zero Gas)	<100	PPB	29	29	
Dark PMT	(-50) - (+200)	mV	44.7	44.7	
Dark lamp	(-50) - (+200)	mV	5.1	5.1	
SAMP PRES	20-30 constant	IN-Hg-A	28.1	27.8	
Electric Test/Optic Test					
PMT Volts	2000 (+/- 500)	mV	2004	2020	
SO2 Conc	1000 (+/- 250)	PPB	1002	1010	
SO2 Slope	1 (+/- 0.3)		0.920	0.866	
SO2 Offset	< 250	mV	65	130.1	
Stability at Zero	< 0.2	PPB	0.1	0.1	
Stability at Span	< 2 ppb @ 400 ppb	PPB	0.6	0.2	
Gas Test Response					
Zero Gas (0.00 PPB)	0	ppb	1.3	0.2	
Span Gas (400 PPB)	400	ppb	405.0	401.0	± 5% of Range

Calibrate By : _____

Approve By : _____

Date: _____

1-Mar-23

Date: _____

1-Mar-23

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SO2 Analyzer Verification Test Report

Calibration Report No.: AP-S6603002

Calibrated Date: 1-Mar-23

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Instruments Information

Page:1/2

Analyzer Type: SO2 Analyzer Model: 100E	Manufacturer API S/N: ESOAI100E01218
--	---

Calibration System

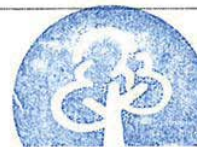
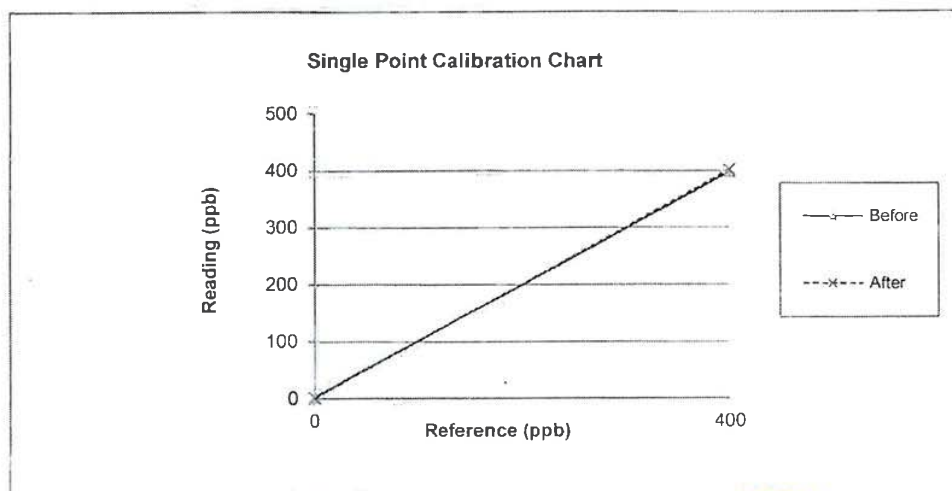
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 25.5 °C

Humidity: 57 %RH

Calibration Report

Status	Zero			Span		
	Reference (ppb)	Reading (ppb)	Drift (ppb)	Reference (ppb)	Reading (ppb)	Drift%
Before	0.0	2.8	2.8	400.0	397.4	-0.3
After	0.0	0.7	0.7	400.0	402.0	0.2



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SO2 Analyzer Verification Test Report

Calibration Report No.: AP-S6603002

Calibrated Date: 1-Mar-23

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Page: 2/2

Test Function Value	Nominal range	Unit	Before	After	Note
Date	1-Mar-23				
Time	13:10				
Range	50 - 20000	PPB	500	500	
Stability (Zero Gas)	< 0.2	PPB	0.6	0.2	
Sample Flow	650 (+/- 50)	cc/min	663	659	
PMT Detector	0 - 5000	mV	36.5	34.5	
Norm PMT Detector	0 - 5000	mV	34.1	32.8	
HVPS	400-900 constant	V	719	648	
DCPS	2500 (+/- 200)	mV	-	-	
RCELL TEMP	50 (+/- 1)	Dreegee C	50	50	
BOX TEMP	20-40	Dreegee C	34.1	32.7	
PMT TEMP	7 (+/-1)	Dreegee C	8.0	8.0	
UV lamp	1000-4900	mV	4034.0	4034.0	
Lamp Ratio	30-120	%	114.0	114.0	
STR. Light (Zero Gas)	<100	PPB	29	29	
Dark PMT	(-50) - (+200)	mV	44.7	44.7	
Dark lamp	(-50) - (+200)	mV	5.1	5.1	
SAMP PRES	20-30 constant	IN-Hg-A	28.1	27.8	
Electric Test/Optic Test					
PMT Volts	2000 (+/- 500)	mV	2004	2020	
SO2 Conc	1000 (+/- 250)	PPB	1002	1010	
SO2 Slope	1 (+/- 0.3)	-	0.920	0.866	
SO2 Offset	< 250	mV	65	130.1	
Stability at Zero	< 0.2	PPB	0.1	0.1	
Stability at Span	< 2 ppb @ 400 ppb	PPB	0.6	0.2	
Gas Test Response					
Zero Gas (0.00 PPB)	0	ppb	2.8	0.7	
Span Gas (400 PPB)	400	ppb	397.4	402.0	± 5% of Range

Calibrate By: _____

Approve By: _____

Date:

1-Mar-23

Date:

1-Mar-23

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ผู้จัดการฝ่ายควบคุมคุณภาพ



บริษัท นีดีส ซัพพลาย อินสตรูเมนต์ จำกัด
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NOx Analyzer Verification Test Report

Calibration Report No.: AP-N6503001

Page:1/1

Calibrated Date: 1-Mar-23

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 200A	Manufacturer API S/N: NNOAI200A02299
---	---

Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 25.6 °C

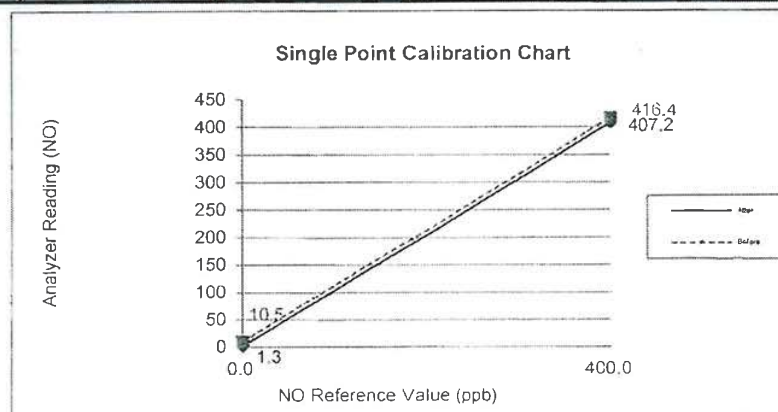
Humidity: 60 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	6.8	0.0	6.8	415.3	400.0	1.9
NO ₂	3.7	0.0	3.7	1.1	0.0	0.1
NOx	10.5	0.0	10.5	416.4	400.0	2.0

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.9	0.0	0.9	404.5	400.0	0.6
NO ₂	0.4	0.0	0.4	2.7	0.0	0.3
NOx	1.3	0.0	1.3	407.2	400.0	0.9



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รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



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NOx Analyzer Verification Test Report

Calibration Report No.: AP-N6503001

Page:1/1

Calibrated Date: 1-Mar-23

☒ PM ☐ Onsite

Page:2/2

Test Function Value	Normal range	Unit	Before	After	Note
Date	1-Mar-23				
Time	15:30				
Range	0.00 - 500.00 PPB	PPB	500.0	500.0	
Stability (Zero Gas)	< 0.2	PPB	0.8	0.2	
Sample Flow	500 +/- 50	cc/min	470.0	476.0	
Ozone Flow	60-90	cc/min	90.0	76.0	
PMT Detector	0-5000	mV	24.8	19.6	
AZERO	-20-150	mV	11.7	7.3	
HVPS	400-900 constant	V	768.0	714.0	
DCPS	2500 +/- 200	mV	-	-	
RCCELL TFMP	50 +/- 1	Dreegee C	50.3	50.3	
BOX TEMP	20-35	Dreegee C	28.0	27.5	
PMT TEMP	7 +/- 1	Dreegee C	7.7	7.8	
IZS TEMP	50 +/- 4	Dreegee C	-	-	
MOLY Temp	315 +/- 5	Dreegee C	313.1	315.0	
RCEL PRES	4-10 constant	IN-Hg-A	7.30	7.30	
SAMP PRES	20-30 constant	IN-Hg-A	31.4	31.3	
NO Slope	1 +/- 0.3		0.647	0.963	
Nox Slope	1 +/- 0.3		0.652	0.940	
NO Offset	-10 to + 150	mV	17.40	6.60	
NOx Offset	-10 to + 150	mV	24.10	12.70	
Span and Cal Values					
Zero Value	NO	0	ppb	6.8	0.9
	NOx	0	ppb	10.5	1.3
Span Value	NO	400	ppb	415.3	404.5
	NOx	400	ppb	416.4	407.2

Calibrate By :

Date:

1-Mar-23

Approve By :

Date:

1-Mar-23



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Co., Ltd. ผู้จัดการฝ่ายควบคุมคุณภาพ



NOx Analyzer Verification Test Report

Calibration Report No.: AP-N6603002

Page:1/1

Calibrated Date: 1-Mar-23

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 200A	Manufacturer API S/N: NNOAI200A02615
---	---

Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 25.7 °C

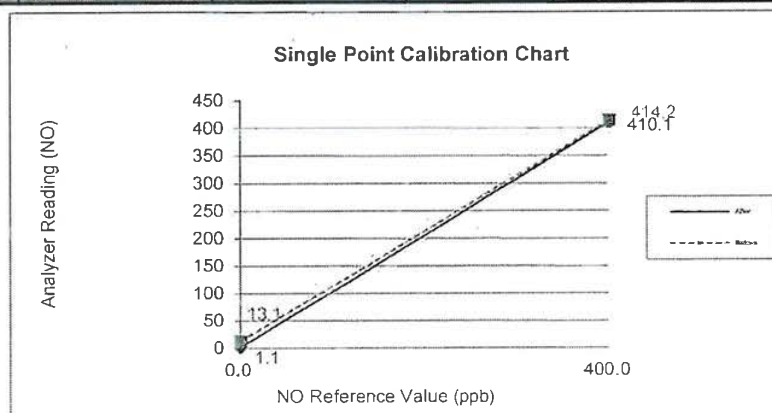
Humidity: 60 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	10.1	0.0	10.1	408.1	400.0	1.0
NO ₂	3.0	0.0	3.0	6.1	0.0	0.7
NOx	13.1	0.0	13.1	414.2	400.0	1.7

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.5	0.0	0.5	405.5	400.0	0.7
NO ₂	0.6	0.0	0.6	4.6	0.0	0.6
NOx	1.1	0.0	1.1	410.1	400.0	1.2





NOx Analyzer Verification Test Report

Calibration Report No.: AP-N6603002

Page:1/1

Calibrated Date: 1-Mar-23

☒ PM ☐ Onsite

Page:2/2

Test Function Value	Normal range	Unit	Before	After	Note
Date	1-Mar-23				
Time	15:30				
Range	0.00 - 500.00 PPB	PPB	500.0	500.0	
Stability (Zero Gas)	< 0.2	PPB	0.8	0.2	
Sample Flow	500 +/- 50	cc/min	470.0	476.0	
Ozone Flow	00-90	cc/min	90.0	76.0	
PMT Detector	0-5000	mV	24.8	19.6	
AZERO	-20-150	mV	11.7	7.3	
HVPS	400-900 constant	V	768.0	714.0	
DCPS	2500 +/- 200	mV	-	-	
RCELL TEMP	60 +/- 1	Degree C	50.3	50.3	
BOX TEMP	20-35	Degree C	28.0	27.5	
PMT TEMP	7 +/- 1	Degree C	7.7	7.8	
IZS TEMP	50 +/- 4	Degree C	-	-	
MOLY Temp	315 +/- 5	Degree C	313.1	315.0	
RCEL PRES	4-10 contant	IN-Hg-A	7.30	7.30	
SAMP PRES	20-30 contant	IN-Hg-A	31.4	31.3	
NO Slope	1 +/- 0.3		0.647	0.963	
Nox Slope	1 +/- 0.3		0.652	0.940	
NO Offset	-10 to + 150	mV	17.40	6.60	
NOx Offset	-10 to + 150	mV	24.10	12.70	
Span and Cal Values					
Zero Value	NO	0	ppb	10.1	0.5
	NOx	0	ppb	13.1	1.1
Span Value	NO	400	ppb	408.1	405.5
	NOx	400	ppb	414.2	410.1

Calibrate By :

Approve By :

Date:

1-Mar-23

Date:

1-Mar-23

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ผู้ตรวจการฝ่ายควบคุมคุณภาพ



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NOx Analyzer Verification Test Report

Calibration Report No.: AP-N6603006

Page:1/1

Calibrated Date: 1-Mar-23

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO ₂ /NO _x Analyzer Model: T200	Manufacturer API S/N: ENOAIT20003572
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Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO ₂ Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 26.4 °C

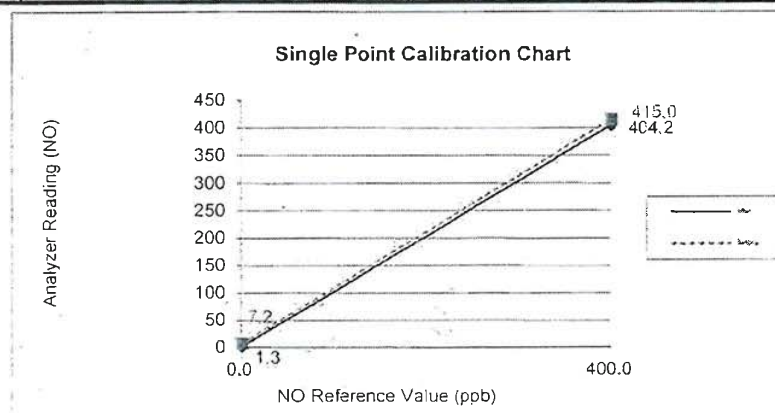
Humidity: 60 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	4.2	0.0	4.2	411.0	400.0	1.4
NO ₂	3.0	0.0	3.0	4.0	0.0	0.5
NO _x	7.2	0.0	7.2	415.0	400.0	1.8

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.9	0.0	0.9	402.4	400.0	0.3
NO ₂	0.4	0.0	0.4	1.8	0.0	0.2
NO _x	1.3	0.0	1.3	404.2	400.0	0.5





NOx Analyzer Verification Test Report

Calibration Report No.: AP-N6603006

Page:1/1

Calibrated Date: 1-Mar-23

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Test Function Value	Nominal range	Unit	Before	After	Note
Date	1-Mar-23				
Time	11:25				
Range	0.00 - 500.00 PPB	PPB	500	500	
Stability (Zero Gas)	< 0.2	PPB	0.4	0.2	
Sample Flow	500 +/- 50	cc/min	500	490	
Ozone Flow	60-90	cc/min	89	80	
PMT Detector	0-5000	mV	50.9	20.4	
AZERU	-20-150	mV	48.3	49.1	
HVPS	400-900 constant	V	745	745	
DCPS	2500 +/- 200	mV	-	-	
RCCELL TEMP	50 +/- 1	Dreegee C	50.0	50.0	
BOX TEMP	20-35	Dreegee C	33.2	32.6	
PMT TEMP	7 +/- 1	Dreegee C	7.2	7.2	
IZS TEMP	50 +/- 4	Dreegee C	-	-	
MOLY Temp	315 +/- 5	Dreegee C	313.3	314.5	
RCEL PRES	4-10 contant	IN-Hg-A	3.7	3.7	
SAMP PRES	20-30 contant	IN-Hg-A	28.3	28.7	
NO Slope	1 +/- 0.3		1.025	1.178	
Nox Slope	1 +/- 0.3		1.066	1.153	
NO Offset	-10 to + 150	mV	0.7	-1.6	
NOx Offset	-10 to + 150	mV	2.1	2.6	
Span and Cal Values					
Zero Value	NO	0	ppb	4.2	0.9
	NOx	0	ppb	7.2	1.3
Span Value	NO	400	ppb	411.0	402.4
	NOx	400	ppb	415.0	404.2

Calibrate By : _____

Approve By : _____

Date: 1-Mar-23

Date: 1-Mar-23

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Neediss Supply Instrument Co., Ltd.





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NOx Analyzer Verification Test Report

Calibration Report No.: AP-N6603004

Page:1/1

Calibrated Date: 1-Mar-23



PM



Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 200E	Manufacturer API S/N: ENOAI200E03407
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Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 25.5 °C

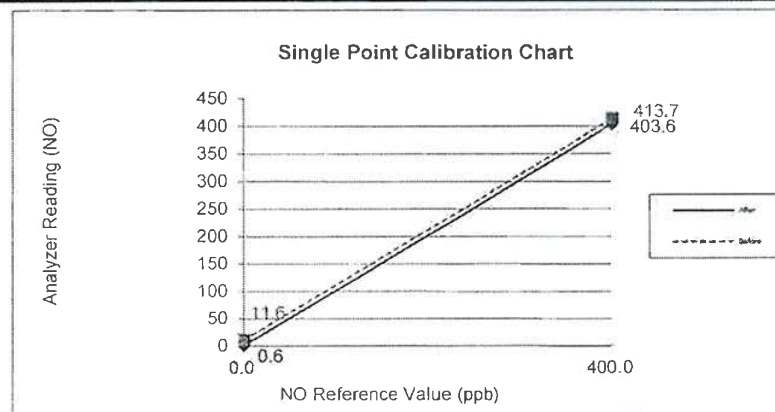
Humidity: 58 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	7.3	0.0	7.3	408.0	400.0	1.0
NO ₂	4.3	0.0	4.3	5.7	0.0	0.7
NOx	11.6	0.0	11.6	413.7	400.0	1.7

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.2	0.0	0.2	398.1	400.0	-0.2
NO ₂	0.4	0.0	0.4	5.5	0.0	0.7
NOx	0.6	0.0	0.6	403.6	400.0	0.4



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NOx Analyzer Verification Test Report

Calibration Report No.: AP-N6603004

Page:1/1

Calibrated Date: 1-Mar-23



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Page:2/2

Test Function Value	Nominal range	Unit	Before	After	Note
Date	1-Mar-23				
Time	10:10				
Range	0.00 - 500.00 PPB	PPB	500	500	
Stability (Zero Gas)	< 0.2	PPB	0.5	0.2	
Sample Flow	500 +/- 50	cc/min	511	532	
Ozone Flow	60 00	cc/min	80	80	
PMT Detector	0-5000	mV	27.4	16.4	
AZERO	-20-150	mV	54.2	54.2	
HVPS	400-900 constant	V	819	819	
DCPS	2500 +/- 200	mV	-	-	
RCELL TEMP	50 +/- 1	Dreegee C	50	50	
BOX TEMP	20-35	Dreegee C	33.7	32.9	
PMT TEMP	7 +/- 1	Dreegee C	7.1	7.1	
IZS TEMP	50 +/- 4	Dreegee C	-	-	
MOLY Temp	315 +/- 5	Dreegee C	314.4	315.0	
RCEL PRES	4-10 contant	IN-Hg-A	10	10	
SAMP PRES	20-30 contant	IN-Hg-A	29.0	29.4	
NO Slope	1 +/- 0.3		0.820	0.801	
Nox Slope	1 +/- 0.3		0.848	0.813	
NO Offset	-10 to + 150	mV	10.2	15.3	
NOx Offset	-10 to + 150	mV	-2.0	-3.4	
Span and Cal Values					
Zero Value	NO	0	ppb	7.3	0.2
	NOx	0	ppb	11.6	0.6
Span Value	NO	400	ppb	408.0	398.1
	NOx	400	ppb	413.7	403.6

Calibrate By :

Date:

1-Mar-23

Approve By :

Date:

1-Mar-23

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EnviLab Co., Ltd.

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Certificate of Calibration

METHOD 6 PRE-TEST CONSOLE CALIBRATION 5-POINT METRIC UNIT

Meter Console Information

Console Model : XC-60B-V
Console Serial Number : 0708023
DGM Model : SK25
DGM Serial Number : 8002471

Calibration Conditions

Barometric Pressure(mm.Hg) : 761
Ambient Temperature(°C) : 24.2
Relative Humidity(%) : 60
Altitude(m) : 1.8

Factors/Conversions

Std. Temp(K) : 293
Std. Press. (mm Hg) : 760
K1 (K/mm Hg) : 0.386

Reference Equipment

WTM Model : DGM-200H
Serial : 000026
Cal. Due Date : 3 Jun 22
Gamma : 1.0000

Metering Console

Run Time (seconds)	Flow Meter	Volume(L)		Meter Temperature(°C)	
		Initial	Final	Initial	Final
(0)	Air 4 lpm	(V _{mi})	(V _{mf})	(t _{mi})	(t _{mf})
8.00	1.0	7025.0	7034.4	24.0	24.0
6.00	1.8	7034.4	7046.8	24.0	24.0
4.00	2.6	7046.8	7059.0	24.0	24.0
3.00	3.4	7059.0	7070.0	24.0	24.0
2.00	4.0	7070.0	7079.2	24.0	24.0

Reference Meter

Initial	Final	Volume(L)		Meter Temperature(°C)	
		(V _{mi})	(V _{mf})	(t _{mi})	(t _{mf})
0.0	0.0	9.659	24.0	24.0	24.0
0.0	0.0	12.773	24.0	24.0	24.0
0.0	0.0	12.325	24.0	24.0	24.0
0.0	0.0	11.781	24.0	24.0	24.0
0.0	0.0	8.656	24.0	24.0	24.0

Results of Gas Meter

Standardized Data		Dry Gas Meter Calibration Factor	
Dry Gas Meter	Reference Meter	Value	Variation
		(V)	(ΔV)
(V _{std})	(V _{std})	(V)	(ΔV)
9.282	9.537	1.027	0.012
12.244	12.611	1.030	0.014
12.047	12.169	1.010	-0.006
10.862	11.632	1.071	0.055
9.094	8.546	0.941	-0.075
		1.016	Y Average

Result of Flow Control

Reference Meter	Flowrate	Flow Meter	
		Console	Rotameter
Std & Corr	Q _{std} (scm)	half ball indicate	drift
1.2	1.0	1.0	0.192
2.1	1.8	1.8	0.302
3.0	2.6	2.6	0.442
3.9	3.4	3.4	0.477
4.3	4.0	4.0	0.273
		Drift Average	
		0.119	

SCLFAC = 0.9598

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

(DGM) Y = 1.016

Note: Rotameter results are calculated from dry gas meter calibration

Calibrate By :

Approved By :

Date

20 Feb 23

The instruments listed and described on this certificate have been calibrated in accordance with the National Institute of Standards and Technology (N.I.S.T.) and in reference to EPA Method 5, Section 10.3.1.

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ผู้จัดการฝ่ายควบคุมคุณภาพ



Certificate of Calibration
Method 6 Console Sensor Calibration - Metric Units

Console Information

Model #: XC-60B-V
Serial #: 0708023
Units: Metric
Pick

Calibration Conditions

Pbar (mm,bar): 1015.0
Humidity (%): 50.7
Temp (°C): 24.2
Elevation (m): 1.8
Corr. Pbar (mm, Hg): 761.00

Reference Devices

TC Simulator Model: CC-VTR-SH
Reference #: 718 30G
Barometer Model: 369037
Reference #: EBARODIALSPE01
Pressure Calibrator Model: 718 30G
Reference #: 9543013

Temperature Sensors Calibration Data

Reference Point ¹	Reference Temp.	Test Thermocouple Calibrations					Reference Point Status ²
		AUX	STACK	PROBE	FILTER	EXIT	
#	°C	°C	°C	°C	°C	°C	Pass/Fail
1	-18	-17	-17	-17	-16	-17	PASS
2	38	39	38	38	38	38	PASS
3	93	93	94	94	94	94	PASS
4	149	151	150	150	150	150	PASS
5	260	261	260	260	260	260	PASS
6	371	372	370	370	371	371	PASS
7	482	482	481	481	481	481	PASS
8	593	593	591	592	592	592	PASS
9	704	704	702	703	703	704	PASS
10	816	816	815	815	816	816	PASS
							PASS
							Overall Audit Status

Ref Point	Theoretical Temp.	DGM Thermocouple Sensor Reading	ΔT_{abs} ⁴
#	°C	°C	°C
Ice Water	1	0	0.00%
Ambient ⁵	2	24.2	0.04%
			0.04%
			PASS

Internal temperature thermocouple is not audited to EPA standards, and should not be used as an official reference for ambient temperature.

Pressure Gauge / Manometer Calibration Data

Console Vacuum Calibration			
Reference Point	Reference Vacuum	Console Vacuum	Reference Point Status ⁶
#	in. Hg	in. Hg	Pass/Fail
1	-5.0	-4.5	PASS
2	-10.0	-9.5	PASS
3	-15.0	-14.5	PASS

Calibrate By:

Approved By:

Date:

20 Feb 23

Notes

¹ Suggested, minimum reference points are 10 (0, 100, 200, 300, 500, 700, 900, 1100, 1500, 1900 °F), can test for more.

² For valid test results, the maximum difference between temperature and reference readings should be less than ± 5.4 °F (± 3 °C) for all thermocouples except for the stack thermocouple which should be less than ± 1.5 absolute temperature from the reference reading and the exit thermocouple which should be less than ± 2 °F (± 1 °C) from the reference reading (EPA Method 2, Section 6.3 and EPA Method 5, Sections 6.1, 1.7-6.1.1.8)

³ Do not change this cell value, it is instead based on input from Cell H8 at the top of this sheet under "Calibration Conditions"

⁴ Absolute temperature difference and other formulas are calculated based on unit input from cell CB at the top of this sheet under "Meter Console Information"

⁵ For valid test results, the maximum difference between console and reference barometric pressure readings should be less than ± 0.1 in. Hg (± 2.5 mm Hg). (EPA Method 5, Section 6.1.2)

⁶ For valid test results, the maximum difference between console and reference vacuum readings should be less than ± 0.5 in. Hg (± 12.5 mm Hg)

⁷ For valid test results, the maximum difference between console and reference vacuum readings should be less than: 0.05 in. H₂O (± 1.25 mm H₂O), or 5% of full scale

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Certificate of Calibration

Method 5 Pre-Test Calibration - Liters (L)

UUT Meter Console Information

Model #:	XC-572-V
Serial #:	A2001003
DGM Model #:	SK25EX
DGM Serial #:	00005796

Calibration Conditions

Bar. Pressure (mm Hg):	758.3
Ambient Temperature (°C):	24.4
Relative Humidity (%):	40
Altitude (m):	1.83
Bar. Pressure Corr. (mm Hg):	758.2

Factors/Conversions:

Std. Temp. (K):	293.15
Std. Press. (mm Hg):	760
K ₁ (K/mm Hg):	0.3857

Reference Equipment

Calibration Meter Model:	DGMR-200H
Cal. Date:	03-Jun-22
Serial No.:	0000026
Gamma:	1.0000

UUT Meter (DGM)

Run Time (s)	Orifice, ΔH (mm H ₂ O)	Volume			Meter Temperature (°C)		Meter Pressure (in. H ₂ O)	Volume (L)			Outlet Temperature (°C)	
		Initial (L)	Final (L)	Total (L)	Initial	Final		Initial	Final	Total	Initial	Final
Θ	P _{m(g)}	V _m	V _{mf}	V _m	t _{mf}	t _{mf}	P _w	V _{wi}	V _{wf}	V _w	t _{wi}	t _{wf}
840.00	13.00	558826.6	558826.6	155.0	24.0	25.0	0.3	0.00	161.61	161.61	24.0	24.0
630.00	25.00	558826.6	558990.4	163.8	25.0	26.0	0.5	0.00	167.48	167.48	24.0	24.0
450.00	50.00	558990.4	559157.0	166.6	26.0	26.0	0.6	0.00	169.53	169.53	24.0	24.0
390.00	80.00	559157.0	559339.6	182.6	27.0	27.0	2.0	0.00	185.73	185.73	24.0	24.0
300.00	120.00	559339.6	559511.4	171.8	27.0	28.0	2.4	0.00	177.09	177.09	24.0	24.0

Reference Meter (WTM)

Standardized Data

Reference Meter (L)		UUT Meter (L)		Correction Factor		ΔH @ (mm H ₂ O)	
Std. Vol.	Std. Flow	Std. Vol.	Std. Flow	Value	Variance	ΔH @	Variance
V _{w(std)}	Q _{w(std)}	V _{m(std)}	V _{w(std)}	Y	ΔY	ΔH @	ΔΔH @
159.16	11.37	152.48	11.4	1.0438	0.0133	44.7	0.091
165.03	15.72	160.78	15.7	1.0264	-0.0042	44.9	0.314
167.09	22.28	163.65	22.3	1.0210	-0.0096	44.8	0.164
183.69	28.26	179.29	28.3	1.0245	-0.0060	44.8	0.199
175.32	35.06	169.05	35.1	1.0370	0.0065	43.8	-0.768
				= Y Avg.		44.6	= ΔH @ Avg.
				1.0306		Metric	

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

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

Pass/Fail Judgment : **Pass**

Calibrate By : [Redacted]

Approved By : [Redacted]

Date: 28 Feb 23

The instruments listed and described on this certificate have been calibrated against standards traceable to the National Institute of Standards and Technology (N.I.S.T.) and in reference to EPA Method 5, Section 10.3.1.

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Nomenclature

P_b - Barometric Pressure
 DGM - Dry Gas Meter
 K_1 - Constant based on standard temp and press
 θ - Run time, in minutes
 P_m - ΔH (Meter Pressure, gauge)
 V_m - Volume collected by test meter, corrected for STP
 $Q_{ref(Std)}$ - Calculated flow rate of test meter
 K' - Critical orifice coefficient
 P_{ref} - Measured pressure of reference meter
 t_{ref} - Temperature measured in reference meter

Equations

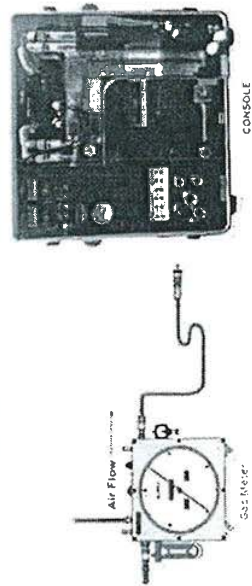
$$V_{ref(Std)} = Y * K_1 * \frac{V_m * (P_{bar} + \frac{P_{m(Std)}}{13.6})}{T_m}$$

$$K_1 * V_m * (P_{bar} + \frac{\Delta H}{13.6}) = \frac{T_m}{T_{ref}} * Q_{ref(Std)}$$

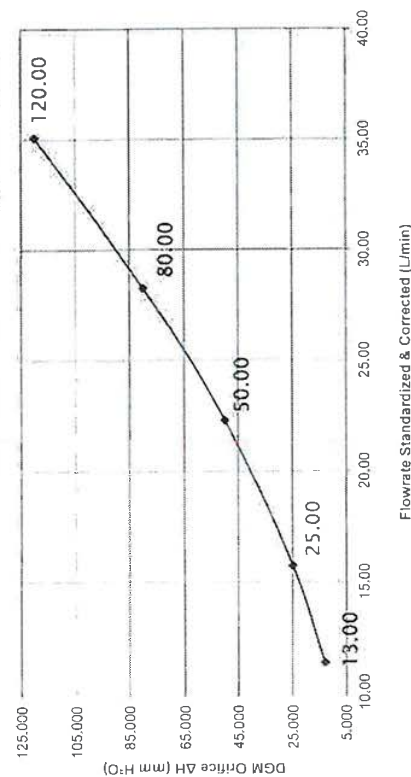
$$K_1 = \frac{T_{std}}{P_{std}} * \frac{V_{ref(Std)}}{V_{m(Std)}} * \frac{Q_{ref(Std)}}{Q_{m(Std)}} = \frac{V_{ref(Std)}}{\theta}$$

$$Metric \Delta H_{ref} = \frac{P_{m(Std)} * 0.0011696 * (P_{bar} + \frac{P_{m(Std)}}{13.6})}{T_{ref}} * \left(\frac{T_m * \theta}{V_m * P_{bar}} \right)^2$$

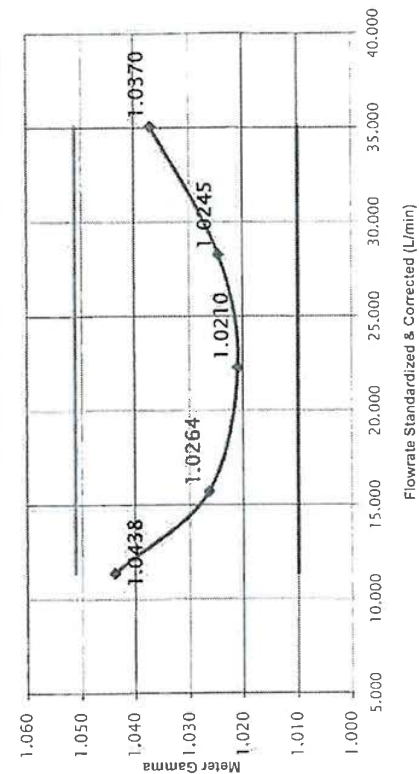
Calibration Train



Meter Pressure vs. Flowrate



Meter Gamma vs. Flowrate





Certificate of Calibration

Method 5 Console Sensor Calibration - Metric Units

Console Information

Model #: XC-572-V
Serial #: A2001003
Units: Metric

Calibration Conditions

Pbar (mm. Hg): 758.3
Humidity (%): 40
Tamb (°C): 24.4
Elevation (m): 1.8
Corr. Pbar (mm. Hg): 758.2

Reference Devices

TC Calibrator Model: CC-VTR-SH
Reference #: 091109269
Barometer Model: 736930
Reference #: EBARODIALSPE01
Pressure Model: 718 30G
Reference #: 9543013

Temperature Display Calibration Data

Reference Point ¹	Reference Temp.	Test Thermocouple Calibrations						Reference Point Status ²
		Aux	Stack	Probe	Oven	Filter	Exit	
#	°C	°C	°C	°C	°C	°C	°C	Pass/Fail
1	-18	-17	-17	-17	-17	-17	-17	PASS
2	38	38	37	38	38	37	37	PASS
3	93	93	93	94	93	93	94	PASS
4	149	150	150	149	149	149	149	PASS
5	260	260	259	259	259	259	259	PASS
6	371	370	371	372	370	370	370	PASS
7	482	481	481	483	481	481	481	PASS
8	593	592	592	594	592	592	592	PASS
9	816	815	816	816	817	816	816	PASS
10	1038	1038	1039	1039	1039	1039	1039	PASS
								Overall Audit Status

NIST Reference Thermocouple ID: 12702001

	Ref Point	Theoretical Temp.	DGM Thermocouple Sensor Reading	ΔT_{abs}^4
	#	°C	°C	°C
Ice Water	1	0.1	0	0.04%
Ambient ³	2	24.4	24	0.08%
			Maximum ²	0.08%
			Status	PASS

Internal temperature thermocouple is not audited to EPA standards, and should not be used as an official reference for ambient temperature.

Calibrate By:

Approved By:

Date: 28 Feb 23

Notes

¹ Suggested, minimum reference points are 10 (0, 100, 200, 300, 500, 700, 900, 1100, 1500, 1900 °F), can test for more.

² For valid test results, the maximum difference between temperature and reference readings should be less than $\pm 5.4^\circ\text{F}$ ($\pm 3^\circ\text{C}$), for all thermocouples except for the stack thermocouple which should be less than $\pm 1.5\%$ absolute temperature from the reference reading and the exit thermocouple which should be less than $\pm 2^\circ\text{F}$ ($\pm 1^\circ\text{C}$) from the reference reading (EPA Method 2, Section 6.3 and EPA Method 5, Sections 6.1.1, 7.6, 1.1.8)

³ Do not change this cell value, it is instead based on input from Cell H6 at the top of this sheet under "Calibration Conditions"

⁴ Absolute temperature difference and other formulas are calculated based on unit input from cell C8 at the top of this sheet under "Meter Console Information"

⁵ For valid test results, the maximum difference between console and reference barometric pressure readings should be less than ± 0.1 in. Hg (± 2.5 mm Hg), (EPA Method 5, Section 6.1.2)

⁶ For valid test results, the maximum difference between console and reference vacuum readings should be less than ± 0.5 in. Hg (± 12.5 mm Hg)

⁷ For valid test results, the maximum difference between console and reference vacuum readings should be less than ± 0.05 in. H₂O (± 1.25 mm H₂O), or 5% of full scale

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neediss Console Sensor Calibration Data Sheet

Console Information

Model #: XC-572-V
Serial #: A2001003
Units: Metric
Type: English
No. of Reading

Calibration Conditions

Pbar (mm. Hg): 758.3
Humidity (%): 40.0
Tamb (°C): 24.4
Corr. Pbar (mm. Hg): 758.2

Reference Devices

TC Simulator Model: CC-VTR-SH
Reference #: 091109269
Barometer Model: 736930
Reference #: EBARODIALSPE01
Digital Pressure Calibrator Model: 718 30G
Reference #: 3891001

Pressure Gauge / Manometer Calibration Data

Console Vacuum Calibration			
Reference Point	Reference Vacuum	Console Vacuum	Reference Point Status ⁶
#	in. Hg	in. Hg	Pass/Fail
1	-5.0	-4.5	PASS
2	-15.0	-14.5	PASS
3	-20.0	-19.5	PASS

Reference Point ¹	ΔH ₁ Manometer Calibration			Reference Point Status ²
	Reference	Positive (+) Pitot	Negative (-) Pitot	
#	mm H ₂ O	mm H ₂ O	mm H ₂ O	Pass/Fail
1	-200.000	0.0	-200.0	PASS
2	-150.000	0.0	-150.0	PASS
3	-100.000	0.0	-100.0	PASS
4	-80.000	0.0	-80.0	PASS
5	-50.000	0.0	-50.0	PASS
6	0.000	0.0	0.0	PASS
7	50.000	50.0	0.0	PASS
8	80.000	80.0	0.0	PASS
9	100.000	100.0	0.0	PASS
10	150.000	150.0	0.0	PASS
11	200.000	200.0	0.0	PASS
ΔH Overall Audit Status				PASS

Reference Point ¹	ΔP ₁ Manometer Calibration			Reference Point Status ²
	Reference	Positive (+) Pitot	Negative (-) Pitot	
#	mm H ₂ O	mm H ₂ O	mm H ₂ O	Pass/Fail
1	-200.000	0.0	-200.0	PASS
2	-150.000	0.0	-150.0	PASS
3	-100.000	0.0	-100.0	PASS
4	-80.000	0.0	-80.0	PASS
5	-50.000	0.0	-50.0	PASS
6	0.000	0.0	0.0	PASS
7	50.000	50.0	0.0	PASS
8	80.000	80.0	0.0	PASS
9	100.000	100.0	0.0	PASS
10	150.000	150.0	0.0	PASS
11	200.000	200.0	0.0	PASS
ΔP Overall Audit Status				PASS

Calibrate By:

Approved By:

Date: 28 Feb 23

Notes

- ¹ Suggested, minimum reference points are 10 (0, 100, 200, 300, 500, 700, 900, 1100, 1500, 1900 °F), can test for more.
- ² For valid test results, the maximum difference between temperature and reference readings should be less than ±5.4 °F (±3 °C), for all thermocouples except for the stack thermocouple which should be less than ±1.5% absolute temperature from the reference reading and the exit thermocouple which should be less than ±2 °F (±1 °C) from the reference.
- ³ Do not change this cell value, it is instead based on input from Cell H8 at the top of this sheet under "Calibration Conditions"
- ⁴ Absolute temperature difference and other formulas are calculated based on unit input from cell C8 at the top of this sheet under "Meter Console Information"
- ⁵ For valid test results, the maximum difference between console and reference barometric pressure readings should be less than 10.1 in. Hg (±2.5 mm Hg), (EPA Method 5, Section 5.1.2)
- ⁶ For valid test results, the maximum difference between console and reference vacuum readings should be less than ±0.5 in. Hg (±12.5 mm Hg)
- ⁷ For valid test results, the maximum difference between console and reference vacuum readings should be less than ±0.05 in. H₂O (±1.25 mm H₂O), or 5% of full scale
- I certify that the above Thermocouple Sensors were calibrated in accordance with US EPA Methods 2 and 5, CFR 40 Part 60.



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neediss Console Sensor Audit QA Sheet

Meter Console Information (UUT)

Model #: XC-572-V
Serial #: A2001003
Units: Metric

Calibration Conditions

Pbar (mm. Hg): 758.3
Humidity (%): 40
Amb. Temp. (°C): 24.4
Altitude (m): 1.8
Corrected Pbar (mm. Hg): 758.2

Reference Devices

TC Simulator Model: CC-VTR-SH
Reference #: 91109269
Barometer Model: 369307
Reference #: EBARODIALSPE01
DP Calibrator Model: 718 30G
Reference #: 9543013

Audit Data

Reference Point	Reference Temp.	Thermocouple Probe Audit						Reference Point Status ¹
		Aux	Stack	Probe	Oven	Filter	Exit	
	°C	°C	°C	°C	°C	°C	°C	Pass/Fail
Room	24.4	24	25	24	24	25	25	PASS
Ice Water	0.1	0	0	0	0	1	1	PASS

Console Vacuum Audit

Reference Point	Reference Vacuum	Console Vacuum	Reference Point Status ²
#	in. Hg	in. Hg	Pass/Fail
1	17.0	16.5	PASS

Calibrate By: _____

Approved By: _____

Date: 28 Feb 23

Notes

¹For valid test results, the maximum difference between test and reference readings should be less than 5.4 °F (3 °C), for all thermocouples except for the stack thermocouple which should be less than 1.5% absolute temperature from the reference reading and the exit thermocouple which should be less than 2°F (1 °C) from the reference reading (EPA Method 2, Section 6.3 and EPA Method 5, Sections 6.1, 1.7-6.1.1.8)

²For valid test results, the maximum difference between console and reference barometric pressure readings should be less than 0.1 in. Hg (2.5 mm Hg), (EPA Method 5, Section 6.1.2)

³For valid test results, the maximum difference between console and reference vacuum readings should be less than 0.5 in. Hg (12.5 mm Hg)

I certify that the above Thermocouple, Barometric, and Vacuum Sensors were calibrated and audited in accordance with US EPA Methods, CFR 40 Part 50.

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neediss Sampling Probe and Pitot Validation

Samplig System Equipment Information

Probe Sheat	Apex 1 in. , 5 ft.
Probe Number	1912458
Pitot tube Number	A8778
Pitot tube Type	S Type 3/8 Inc.
Validation method	Standard Probe 1 in. and 1/2 in. Sampling Nozzle

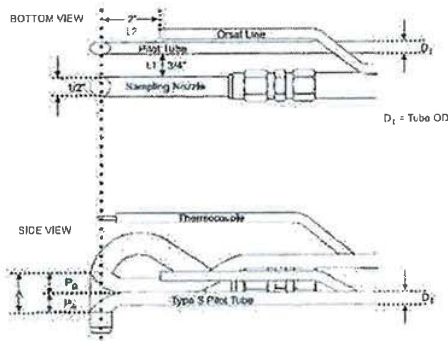
Validation Conditions and Equipment

Digital Callpers	CD-15APX
Reference No.	A22070181
Digital Inclinator	BASELINE
Reference No.	FEI 12-1057
Temperatute	24.4 °C±3
Barometric Pressure	758.3 mm Hg

Sampling Probe Validation with Tune up

☒ Measure and Alinment with 1/2" Sampling Nozzle(12.7 mm)

Measured	Standard Range
$L_1 = 1.90 \text{ cm.}$	(1.905 cm. or 3/4 in.)
$L_2 = 5.03 \text{ cm.}$	(5.08 cm. or 2.0 in.)
$D_T = 0.955 \text{ cm.}$	(3/8 in.)
$A = 2.08 \text{ cm.}$	($2.1 D_T \leq A \leq 3D_T$)
$A/2D_T = 1.091 \text{ cm.}$	($1.05 P_A / D_T \leq A \leq 1.5$)



Pitot Tube Validations and Engles measurement Result

☒ : Measure Result after Maintanance and Adjustable

P_9 Size Standard Range

$\alpha_1 = 3.00^\circ \leq 10^\circ$

$\beta_1 = 1.10^\circ \leq 5^\circ$

P_A Size

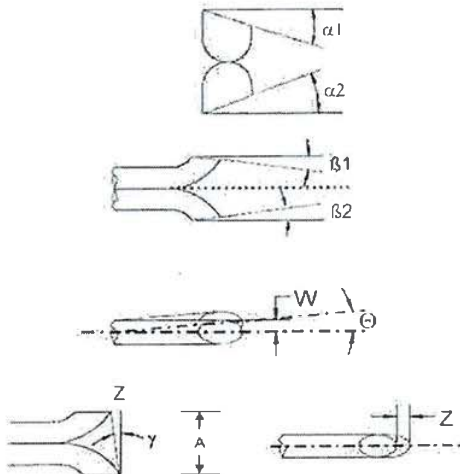
$\alpha_2 = 2.20^\circ \leq 10^\circ$

$\beta_2 = -2.00^\circ \leq 5^\circ$

Engles measurement Calculated Result Standard Range

$W = -1.10^\circ -0.040 \text{ cm. } W < 0.08 \text{ cm (1/32 in.)}$

$Z = 1.10^\circ 0.040 \text{ cm. } Z < 0.032 \text{ cm (1/8 in.)}$



Can be use 0.84 for $C_p(s)$ if the type of face-opening misalignent show above with not affect the base line value of $C_p(s)$ Solong as standard range

Validation By:

Approved By:

Date:

28 Feb 23

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Nozzle Validation

Samplig System Equipment Information

Console Model	XC-572-V
Console Number	A2001003
DGM Model	SK25EX
DGM Number	00005796

Validation Conditions

Digital Calipers	CD-15APX
Reference No	A22070181
Temperatute	24.8 °C±3
Barometric Pressure	758.2 mm.Hg

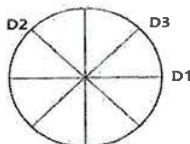
Validation Data					Results	
Nozzle ID	Nozzle Diameter				Different	(D ₁ + D ₂ + D ₃) / 3
Sizes		D ₁	D ₂	D ₃	ΔD	D _{avg}
	mm	mm	mm	mm	mm	mm
NS-5	3.96	3.97	3.97	3.97	0.000	3.970
NS-7	5.30	5.00	4.97	4.96	0.021	4.977
NS-9	7.13	7.10	7.10	7.11	0.006	7.103
NS-11	8.71	8.47	8.47	8.53	0.035	8.490
NS-13	10.31	10.31	10.29	10.30	0.010	10.300
NS-15	11.88	11.80	11.79	11.79	0.006	11.793
NS-17	13.48	13.48	13.49	13.49	0.006	13.487

Where :

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

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

D avg = (D₁ + D₂ + D₃) / 3



Validation By:



Approved By:



Date:

28 Feb 23



Neediss Supply Instrument Co.,Ltd.



รับรองสาเหตูกดอง

ผู้ว่าการฝ่ายควบคุมคุณภาพ



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Tel 02-802-3780-2 Fax 02-802-3788 Email: info@neediss.com



Verification Test Report

Page:1/2

Instruments Information

Analyzer Type:	Flue Gas Analyser	Manufacturer:	MRU
Model:	Optima7	S/N:	319178

Calibration Gas information

Calibrator Unit	Standard Gas Mid Range	Standard Gas High Range
ZERO AIR Gen:	O2 Conc 7.79 %vol.	O2 Conc 17.65 %vol.
Ecotech8301	Cd/Ex: GN0025075/Aug 3,2028	Cd/Ex: Gn0025056/Aug 3,2028
Dilutor Model:	CO Conc 4500 ppm	CO Conc 593.9 ppm
EcotechGasCal1100	NO Conc 44.62 ppm	NO Conc 198.6 ppm
	NOX Conc 44.68 ppm	NOX Conc 198.6 ppm
	SO2 Conc 45.34 ppm	SO2 Conc 201.8 ppm
	Cd/Ex: EB0140762/Feb 19,2024	Cd/Ex: GN0016961/Feb 22,2029

Environment: Temperature 25.4 °C Humidity: 76 %RH

SO2 calibration test

Before Adj					Reading (After Adj)
Set point	Std.gas (ppm)	Reading (ppm)	Difference	% error	Reading (ppm)
Low/Zero	0.0	0	0.0	0.0	0
Mid	45.34	42	-3.3	-7.4	46
Hight	201.8	172	-29.8	-14.8	201

NO calibration test

Before Adj					Reading (After Adj)
Set point	Std.gas (ppm)	Reading (ppm)	Difference	% error	Reading (ppm)
Low/Zero	0.0	0	0.0	0.0	0
Mid	44.62	37	-7.6	-17.1	45
Hight	198.6	172	-26.6	-13.4	199

NOX calibration test

Before Adj					Reading (After Adj)
Set point	Std.gas (ppm)	Reading (ppm)	Difference	% error	Reading (ppm)
Low/Zero	0.0	0	0.0	0.0	0
Mid	44.8	40.0	-4.8	-10.7	45
Hight	198.6	174.0	-24.6	-12.4	202

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Tel 02-802-2980 E Fax 02-802-2988 Email: info@neediss.com



Verification Test Report

Page:2/2

Instruments Information

Analyzer Type:	Flue Gas Analyser	Manufacturer:	MRU
Model:	Optima7	S/N:	319178

Calibration Gas information

Calibrator Unit	Standard Gas Mid Range			Standard Gas High Range		
ZERO AIR Gen:	O2 Conc	7.79	%vol.	O2 Conc	17.65	%vol.
Ecotech8301	Cd/Ex:	GN0025075/Aug 3,2028		Cd/Ex:	Gn0025056/Aug 3,2028	
Dilutor Model:	CO Conc	4500	ppm	CO Conc	593.9	ppm
EcotechGasCal1100	NO Conc	44.62	ppm	NO Conc	198.6	ppm
	NOX Conc	44.68	ppm	NOX Conc	198.6	ppm
	SO2 Conc	45.34	ppm	SO2 Conc	201.8	ppm
	Cd/Ex:	EB0140762/Feb 19,2024		Cd/Ex:	GN0016961/Feb 22,2029	

Environment: Temperature 25.4 °C Humidity: 76 %RH

CO calibration test

Before Adj					Reading (After Adj)
Set point	Std.gas (ppm)	Reading (ppm)	Difference	% error	Reading (ppm)
Low/Zero	0.0	0.0	0.0	0.0	0
Mid	593.9	539.0	-54.9	-9.2	596
Hight	4500	4137	-363.0	-8.1	4484

O2 calibration test

Before Adj					Reading (After Adj)
Set point	Std.gas (ppm)	Reading (ppm)	Difference	% error	Reading (ppm)
Low/Zero	0.0	0	0.0	0.0	-
Mid	7.79	7.4	-0.4	-5.0	7.4
Hight	17.65	17.6	0.0	-0.3	17.6



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Neediss Supply Instrument Co.,Ltd.

Calibrate By :

[Signature]

Approve By :

[Signature]

Date: 11 May 22

Date: 11-May-2022

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CAL

Calibratech Co.,Ltd.

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

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



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 65-200051-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.
540, 540/1 Soi Bangkhae7, Bangkhae, Bangkok 10160

Equipment : Electronic Balance
Manufacturer : Sartorius **Model :** SECURA125-IS
Serial No. : 0034606552 **ID No. :** ELABBALANCEN05
Capacity : 120 g **Resolution :** 0.0001 g

Environment : On site calibration was carried out at the B304 Balance Room, Envilab Co., Ltd.
Ambient Temperature : (24.5 to 24.7) °C
Relative Humidity : (57.1 to 58.2) %
Air Pressure : 1011.0 mbar

Date of Received : 02 March 2022

Date of Calibration : 02 March 2022

Date of Issue : 03 March 2022

Calibrated by : [REDACTED]

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14
Edition 5, July 2015

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02213103	18 Nov 2022	National Institute of Metrology (Thailand), (NIMT)

Approved by :



Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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CAL-F0031-03



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CAL

Calibratech Co.,Ltd.

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

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

Certificate of Calibration

Certificate No. : 65-200051-1

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)
0.1	0.0000	0.000083
0.5	0.0000	0.000084
1	0.0000	0.000085
2	0.0000	0.000086
5	0.0000	0.000088
10	0.0000	0.000092
20	0.0000	0.000099
50	0.0000	0.00012
100	0.0000	0.00020
120	-0.0001	0.00038

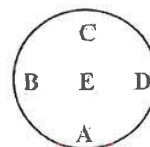
This result of calibration was found accurate as shown on date and place of calibration only.

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.00$, providing a level of confidence of approximately 95%

Eccentric error

Load test : 20 g

A	B	C	D	E	
0.0000	0.0001	0.0001	0.0000	0.0000	g



Repeatability

Load test : 100 g

Stdev. : 0.00004 g

- o0o -



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Certificate of Calibration

METHOD 6 PRE-TEST CONSOLE CALIBRATION 5-POINT METRIC UNIT

Meter Console Information

Console Model : XC-60B-V
Console Serial Number : 0708023
DGM Model : SK25
DGM Serial Number : 8002471

Calibration Conditions

Barometric Pressure(mm.Hg) : 761
Ambient Temperature(°C) : 24.2
Relative Humidity(%) : 60
Altitude(m) : 1.8

Factors/Conversions

Std. Temp(K) : 293
Std. Press. (mm Hg) : 760
K1 (K/mm Hg) : 0.386

Reference Equipment

WTM Model : DGM-200H
Serial : 000026
Cal. Due Date : 3 Jun 22
Gamma : 1.0000

Metering Console

Run Time (seconds)	Flow Meter	Volume(L)		Meter Temperature(°C)	
		Initial	Final	Initial	Final
(e)	Air 4 lpm	(V _{mi})	(V _{mf})	(t _{mi})	(t _{mf})
8.00	1.0	7025.0	7034.4	24.0	24.0
6.00	1.8	7034.4	7046.8	24.0	24.0
4.00	2.6	7046.8	7059.0	24.0	24.0
3.00	3.4	7059.0	7070.0	24.0	24.0
2.00	4.0	7070.0	7079.2	24.0	24.0

Reference Meter

Volume(L)	Meter Temperature(°C)	
	Initial	Final
(V _{wi})	(V _{wf})	(t _{wf})
0.0	9.659	24.0
0.0	12.773	24.0
0.0	12.325	24.0
0.0	11.781	24.0
0.0	8.656	24.0

Results of Gas Meter

Standardized Data			Dry Gas Meter Calibration Factor	
Dry Gas Meter	Reference Meter	Value	Variation	(ΔY)
(V _{mi(g)})	(V _{wi(g)})	(Q _{wi(g)})	(ΔY)	
9.282	1.160	1.192	1.027	0.012
12.244	2.041	2.102	1.030	0.014
12.047	3.012	3.042	1.010	-0.006
10.862	3.621	3.877	1.071	0.055
9.084	4.542	4.273	0.941	-0.075
			Y Average	
			1.016	

Result of Flow Control

Reference Meter	Flow Meter	
	Console	Rotameter
Flowrate	Litre per min.	Variation
(Q _{mi(g)})	half ball indicate	drift
1.2	Litre/min.	Litre/min.
2.1	1.0	0.192
3.0	1.8	0.302
3.9	2.6	0.442
4.3	3.4	0.477
		Drift Average
		0.119

SCLFAC = 0.9598

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

(DGM) Y = 1.016

Note: Rotameter results are calculated from dry gas meter calibration

Calibrate By :

Approved By :

Date

20 Feb 23

The instruments listed and described on this certificate are the property of Neediss Supply Instrument Co., Ltd.



Neediss Supply Instrument Co., Ltd.



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Certificate of Calibration

Method 6 Console Sensor Calibration - Metric Units

Console Information

Model #: XC-80B-V
Serial #: 0708023
Units: Metric
Pick

Calibration Conditions

Pbar (mm.bar): 1015.0
Humidity (%): 50.7
Temp (°C): 24.2
Elevation (m): 1.8
Corr. Pbar (mm. Hg): 761.00

Reference Devices

TC Simulator Model: CC-VTR-SH
Reference #: 718 30G
Barometer Model: 369037
Reference #: EBARODIALSPE01
Pressure Calibrator Model: 718 30G
Reference #: 9543013

Temperature Sensors Calibration Data

Reference Point ¹	Reference Temp.	Test Thermocouple Calibrations					Reference Point Status ²
		AUX	STACK	PROBE	FILTER	EXIT	
#	°C	°C	°C	°C	°C	°C	Pass/Fail
1	-18	-17	-17	-17	-16	-17	PASS
2	38	39	38	38	38	38	PASS
3	93	93	94	94	94	94	PASS
4	149	151	150	150	150	150	PASS
5	260	261	260	260	260	260	PASS
6	371	372	370	370	371	371	PASS
7	482	482	481	481	481	481	PASS
8	593	593	591	592	592	592	PASS
9	704	704	702	703	703	704	PASS
10	816	816	815	815	816	816	PASS
							Overall Audit Status

Ref Point	Theoretical Temp.	DGM Thermocouple Sensor Reading	ΔT_{abs} ⁴
#	°C	°C	°C
Ice Water	1	0	0.00%
Ambient ⁵	2	24.2	0.04%
			0.04%
			PASS

Internal temperature thermocouple is not audited to EPA standards, and should not be used as an official reference for ambient temperature.

Pressure Gauge / Manometer Calibration Data

Console Vacuum Calibration			
Reference Point	Reference Vacuum	Console Vacuum	Reference Point Status ⁶
#	in. Hg	in. Hg	Pass/Fail
1	-5.0	-4.5	PASS
2	-10.0	-9.5	PASS
3	-15.0	-14.5	PASS

Calibrate By: _____

Approved By: _____

Date: _____

20 Feb 23

Notes

¹ Suggested, minimum reference points are 10 (0, 100, 200, 300, 500, 700, 900, 1100, 1500, 1900 °F), can test for more.

² For valid test results, the maximum difference between temperature and reference readings should be less than ± 5.4 °F (± 3 °C), for all thermocouples except for the stack thermocouple which should be less than $\pm 1.5\%$ absolute temperature from the reference reading and the exit thermocouple which should be less than ± 2 °F (± 1 °C) from the reference reading (EPA Method 2, Section 6.3 and EPA Method 5, Sections 6.1.1.7-6.1.1.8)

³ Do not change this cell value, it is instead based on input from Cell H8 at the top of this sheet under "Calibration Conditions"

⁴ Absolute temperature difference and other formulas are calculated based on unit input from cell C8 at the top of this sheet under "Meter Console Information"

⁵ For valid test results, the maximum difference between console and reference barometric pressure readings should be less than ± 0.1 in. Hg (± 2.5 mm Hg), (EPA Method 5, Section 6.1.2)

⁶ For valid test results, the maximum difference between console and reference vacuum readings should be less than ± 0.5 in. Hg (± 12.5 mm Hg)

⁷ For valid test results, the maximum difference between console and reference vacuum readings should be less than ± 0.05 in. H₂O (± 1.25 mm H₂O), or 5% of full scale

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Certificate of Calibration

Method 5 Pre-Test Calibration - Liters (L)

UUT Meter Console Information

Model #:	XC-572-V
Serial #:	A2001003
DGM Model #:	SK25EX
DGM Serial #:	00005796

Calibration Conditions

Bar. Pressure (mm Hg):	758.3
Ambient Temperature (°C):	24.4
Relative Humidity (%):	40
Altitude (m):	1.83
Bar. Pressure Corr. (mm Hg):	758.2

Factors/Conversions

Std. Temp. (K):	293.15
Std. Press. (mm Hg):	760
K ₁ (K/mm Hg):	0.3857

Reference Equipment

Calibration Meter Model:	DGMR-200H
Cal. Date:	03-Jun-22
Serial No.:	00000026
Gamma:	1.0000

UUT Meter (DGM)

Run Time (seconds)	Orifice, ΔH (mm H ₂ O)	Volume (L)		Meter Temperature (°C)		Meter Pressure (in H ₂ O)	Volume (L)		Outlet Temperature (°C)	
		Initial (L)	Final (L)	Initial	Final		Initial	Final	Initial	Final
Θ	P _{mf} (g)	V _{mf}	V _{mf}	t _{mf}	t _{mf}	P _w	V _{wf}	V _{wf}	t _{wf}	t _{wf}
840.00	13.00	558671.6	558826.6	24.0	25.0	0.3	0.00	161.61	24.0	24.0
630.00	25.00	558826.6	558990.4	25.0	26.0	0.5	0.00	167.48	24.0	24.0
450.00	50.00	558990.4	559157.0	26.0	26.0	0.6	0.00	169.53	24.0	24.0
390.00	80.00	559157.0	559339.6	27.0	27.0	2.0	0.00	185.73	24.0	24.0
300.00	120.00	559339.6	559511.4	27.0	28.0	2.4	0.00	177.09	24.0	24.0

Reference Meter (WTM)

Volume (L)		Total		Outlet Temperature (°C)	
Initial	Final	Initial	Final	Initial	Final
V _{wf}	V _{wf}	V _{wf}	V _{wf}	t _{wf}	t _{wf}
0.00	161.61	161.61	161.61	24.0	24.0
0.00	167.48	167.48	167.48	24.0	24.0
0.00	169.53	169.53	169.53	24.0	24.0
0.00	185.73	185.73	185.73	24.0	24.0
0.00	177.09	177.09	177.09	24.0	24.0

Standardized Data

Reference Meter (L)		UUT Meter (L)		Correction Factor		ΔH @ (mm H ₂ O)	
Std. Vol.	Std. Flow	Std. Vol.	Std. Flow	Value	Variance	ΔH @	Variance
V _{wf} (std)	Q _{wf} (std)	V _{mf} (std)	V _{wf} (std)	Y	ΔY	ΔH @	ΔΔH @
159.16	11.37	152.48	11.4	1.0438	0.0133	44.7	0.091
165.03	15.72	160.78	15.7	1.0264	-0.0042	44.9	0.314
167.09	22.28	163.65	22.3	1.0210	-0.0096	44.8	0.164
183.69	28.26	179.29	28.3	1.0245	-0.0060	44.8	0.199
175.32	35.06	169.05	35.1	1.0370	0.0065	43.8	-0.768
				= Y Avg.		= ΔH @ Avg.	
				1.0306		44.6	

Metric

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

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

Pass/Fail Judgment : **Pass**

Calibrate By: [Redacted]

Approved By: [Redacted]

Date: 28 Feb 23

The instruments have been calibrated against standards traceable to the National Institute of Standards and Technology (NIST), and in reference to EPA Method 5, Section 10.3.1.

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Certificate of Calibration - Supplemental

Nomenclature

- P_b - Barometric Pressure
- DGM - Dry Gas Meter
- K_1 - Constant based on standard temp and press
- ϕ - Run time, in minutes
- P_m - ΔH (Meter Pressure, gauge)
- V_m - Volume collected by test meter, corrected for STP
- $Q_{m(stp)}$ - Calculated flow rate of test meter
- K' - Critical orifice coefficient
- P_w - Measured pressure of reference meter
- T_w - Temperature measured in reference meter

Equations

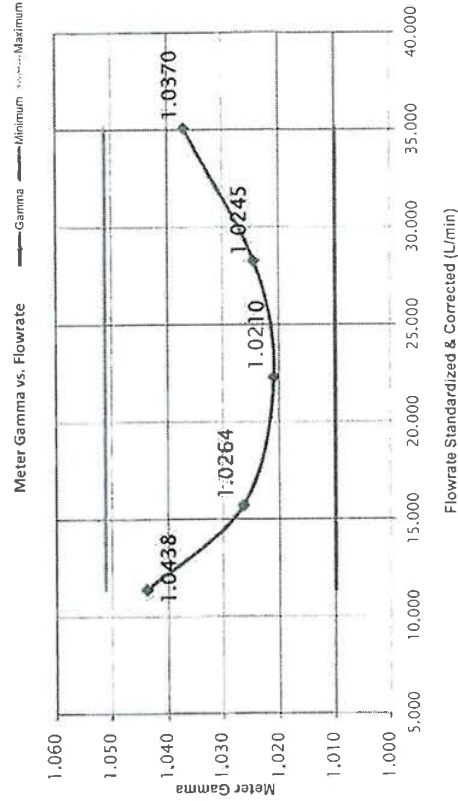
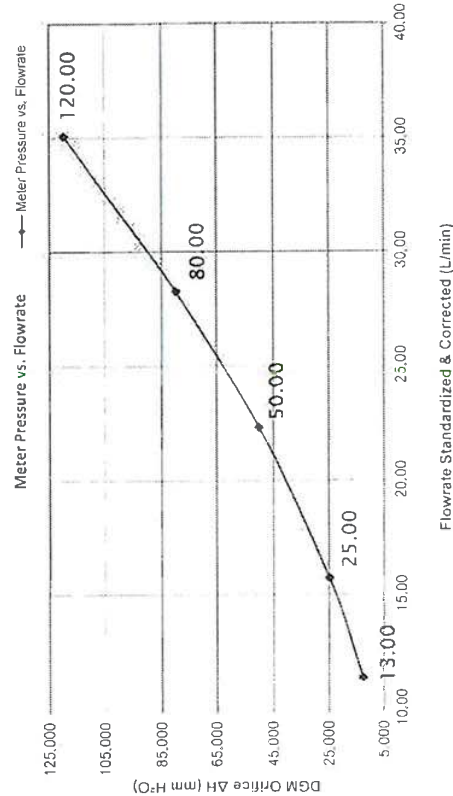
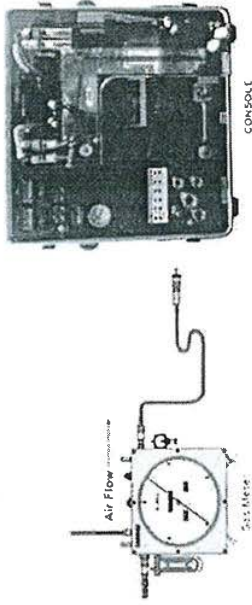
$$V_{m(stp)} = Y \cdot K_1 \cdot \frac{V_w \cdot (P_{bar} + \frac{P_{atm}}{13.6})}{T_w}$$

$$V_{m(stp)} = \frac{K_1 V_m (P_{bar} + \frac{\Delta H}{13.6})}{T_m}$$

$$K_1 = \frac{T_{std}}{P_{std}} \quad Y = \frac{V_{ref(stp)}}{V_{m(stp)}} \quad Q_{m(stp)} = \frac{V_{m(stp)}}{\phi}$$

$$\Delta Metric \Delta H_m = \frac{P_{m(stp)} \cdot 0.0011696 \cdot (P_{bar} + \frac{P_{atm}}{13.6})}{T_m} \cdot \left(\frac{T_m \cdot \phi}{V_m \cdot P_{bar}} \right)^2$$

Calibration Train



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Certificate of Calibration
Method 5 Console Sensor Calibration - Metric Units

Console Information

Model #: XC-572-V
Serial #: A2001003
Units: Metric

Calibration Conditions

Pbar (mm. Hg): 758.3
Humidity (%): 40
Tamb (°C): 24.4
Elevation (m): 1.8
Corr. Pbar (mm. Hg): 758.2

Reference Devices

TC Calibrator Model: CC-VTR-SH
Reference #: 091109269
Barometer Model: 736930
Reference #: EBARODIALSPE01
Pressure Model: 718 30G
Reference #: 9543013

Temperature Display Calibration Data

Reference Point ¹	Reference Temp.	Test Thermocouple Calibrations						Reference Point Status ²
		Aux	Stack	Probe	Oven	Filter	Exit	
#	°C	°C	°C	°C	°C	°C	°C	Pass/Fail
1	-18	-17	-17	-17	-17	-17	-17	PASS
2	38	38	37	38	38	37	37	PASS
3	93	93	93	94	93	93	94	PASS
4	149	150	150	149	149	149	149	PASS
5	260	260	259	259	259	259	259	PASS
6	371	370	371	372	370	370	370	PASS
7	482	481	481	483	481	481	481	PASS
8	593	592	592	594	592	592	592	PASS
9	816	815	816	816	817	816	816	PASS
10	1038	1038	1039	1039	1039	1039	1039	PASS

Overall Audit Status

NIST Reference Thermocouple ID: 12702001

	Ref Point	Theoretical Temp.	DGM Thermocouple Sensor Reading	ΔT_{abs} ⁴
	#	°C	°C	°C
Ice Water	1	0.1	0	0.04%
Ambient ³	2	24.4	24	0.08%

Maximum² 0.08%

Status PASS

Internal temperature thermocouple is not audited to EPA standards, and should not be used as an official reference for ambient temperature.

Calibrate By:

Approved By:

Date: 28 Feb 23

Notes

¹ Suggested, minimum reference points are 10 (0, 100, 200, 300, 500, 700, 900, 1100, 1500, 1900 °F), can test for more,

² For valid test results, the maximum difference between temperature and reference readings should be less than ± 5.4 °F (± 3 °C), for all thermocouples except for the stack thermocouple which should be less than $\pm 1.5\%$ absolute temperature from the reference reading and the exit thermocouple which should be less than ± 2 °F (± 1 °C) from the reference reading (EPA Method 2, Section 6.3 and EPA Method 5, Sections 6.1.1.7-6.1.1.8)

³ Do not change this cell value, it is instead based on input from Cell H8 at the top of this sheet under "Calibration Conditions"

⁴ Absolute temperature difference and other formulas are calculated based on unit input from cell C6 at the top of this sheet under "Meter Console Information"

⁵ For valid test results, the maximum difference between console and reference barometric pressure readings should be less than ± 0.1 in. Hg (± 2.5 mm Hg), (EPA Method 5, Section 6.1.2)

⁶ For valid test results, the maximum difference between console and reference vacuum readings should be less than ± 0.5 in. Hg (± 12.5 mm Hg)

⁷ For valid test results, the maximum difference between console and reference vacuum readings should be less than ± 0.05 in. H₂O (± 1.25 mm H₂O) or 5% of full scale



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neediss Console Sensor Calibration Data Sheet

Console Information

Model #: XC-572-V
Serial #: A2001003
Units: Metric
Type: English

Calibration Conditions

Pbar (mm. Hg): 758.3
Humidity (%): 40.0
Tamb (°C): 24.4
Corr. Pbar (mm. Hg): 758.2

Reference Devices

TC Simulator Model: CC-VTR-SH
Reference #: 091109269
Barometer Model: 736930
Reference #: EBARODIALSPE01
Digital Pressure Calibrator Model: 718 30G
Reference #: 3891001

Pressure Gauge / Manometer Calibration Data

Console Vacuum Calibration			
Reference Point	Reference Vacuum	Console Vacuum	Reference Point Status ⁶
#	in. Hg	in. Hg	Pass/Fail
1	-5.0	-4.5	PASS
2	-15.0	-14.5	PASS
3	-20.0	-19.5	PASS

Reference Point ¹	ΔH Manometer Calibration			Reference Point Status ²
	Reference	Positive (+) Pitot	Negative (-) Pitot	
#	mm H2O	mm H2O	mm H2O	Pass/Fail
1	-200.000	0.0	-200.0	PASS
2	-150.000	0.0	-150.0	PASS
3	-100.000	0.0	-100.0	PASS
4	-80.000	0.0	-80.0	PASS
5	-50.000	0.0	-50.0	PASS
6	0.000	0.0	0.0	PASS
7	50.000	50.0	0.0	PASS
8	80.000	80.0	0.0	PASS
9	100.000	100.0	0.0	PASS
10	150.000	150.0	0.0	PASS
11	200.000	200.0	0.0	PASS
ΔH Overall Audit Status				PASS

Reference Point ¹	ΔP Manometer Calibration			Reference Point Status ²
	Reference	Positive (+) Pitot	Negative (-) Pitot	
#	mm H2O	mm H2O	mm H2O	Pass/Fail
1	-200.000	0.0	-200.0	PASS
2	-150.000	0.0	-150.0	PASS
3	-100.000	0.0	-100.0	PASS
4	-80.000	0.0	-80.0	PASS
5	-50.000	0.0	-50.0	PASS
6	0.000	0.0	0.0	PASS
7	50.000	50.0	0.0	PASS
8	80.000	80.0	0.0	PASS
9	100.000	100.0	0.0	PASS
10	150.000	150.0	0.0	PASS
11	200.000	200.0	0.0	PASS
ΔP Overall Audit Status				PASS

Calibrate By :

Approved By :

Date: 28 Feb 23

Notes

¹ Suggested, minimum reference points are 10 (0, 100, 200, 300, 500, 700, 900, 1100, 1500, 1900 °F), can test for more.

² For valid test results, the maximum difference between temperature and reference readings should be less than ±5.4 °F (±3 °C), for all thermocouples except for the stack thermocouple which should be less than ±1.5% absolute temperature from the reference reading and the exit thermocouple which should be less than ±2°F (±1 °C) from the reference

³ Do not change this cell value, it is instead based on input from Cell H8 at the top of this sheet under "Calibration Conditions"

⁴ Absolute temperature difference and other formulas are calculated based on unit input from cell C8 at the top of this sheet under "Meter Console Information"

⁵ For valid test results, the maximum difference between console and reference barometric pressure readings should be less than ±0.1 in. Hg (±2.5 mm Hg) (EPA Method 5, Section 5.1.2)

⁶ For valid test results, the maximum difference between console and reference vacuum readings should be less than ±0.5 in. Hg (±12.5 mm Hg)

⁷ For valid test results, the maximum difference between console and reference vacuum readings should be less than ±0.05 in. H2O (±1.25 mm H2O), or 5% of full scale
I certify that the above Thermocouple Sensors were calibrated in accordance with US EPA Methods 2 and 5, CFR 40 Part 60.



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Console Sensor Audit QA Sheet

Meter Console Information (UUT)

Model #: XC-572-V
 Serial #: A2001003
 Units: Metric

Calibration Conditions

Pbar (mm. Hg): 758.3
 Humidity (%): 40
 Amb. Temp. (°C): 24.4
 Altitude (m): 1.8
 Corrected Pbar (mm. Hg): 758.2

Reference Devices

TC Simulator Model: CC-VTR-SH
 Reference #: 91109269
 Barometer Model: 369307
 Reference #: EBARODIALSPE01
 DP Calibrator Model: 718 30G
 Reference #: 9543013

Audit Data

Reference Point	Reference Temp	Thermocouple Probe Audit						Reference Point Status ¹
		Aux	Stack	Probe	Oven	Filter	Exit	
	°C	°C	°C	°C	°C	°C	°C	Pass/Fail
Room	24.4	24	25	24	24	25	25	PASS
Ice Water	0.1	0	0	0	0	1	1	PASS

Console Vacuum Audit

Reference Point	Reference Vacuum	Console Vacuum	Reference Point Status ²
#	in. Hg	in. Hg	Pass/Fail
1	17.0	16.5	PASS

Calibrate By: _____

Approved By: _____

Date: 28 Feb 23

Notes

¹For valid test results, the maximum difference between test and reference readings should be less than 5.4 °F (3 °C), for all thermocouples except for the stack thermocouple which should be less than 1.5% absolute temperature from the reference reading and the exit thermocouple which should be less than 2°F (1 °C) from the reference reading (EPA Method 2, Section 6.3 and EPA Method 5, Sections 6.1.1.7-6.1.1.8)

²For valid test results, the maximum difference between console and reference barometric pressure readings should be less than 0.1 in. Hg (2.5 mm Hg). (EPA Method 5, Section 6.1.2)

³For valid test results, the maximum difference between console and reference vacuum readings should be less than 0.5 in. Hg (12.5 mm Hg)

I certify that the above Thermocouple, Barometric, and Vacuum Sensors were calibrated and audited in accordance with US EPA Methods, CFR 40 Part 60.

neediss

Neediss Supply Instrument Co., Ltd.



รับรองสำเนาถูกต้อง
 ผู้จัดการฝ่ายควบคุมคุณภาพ

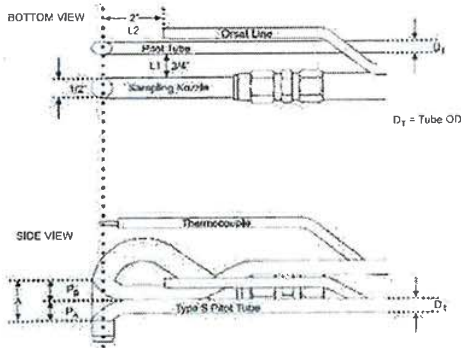
neediss Sampling Probe and Pitot Validation

Samplig System Equipment Information

Probe Sheat	Apex 1 in. , 5 ft.
Probe Number	1912458
Pitot tube Number	A8778
Pitot tube Type	S Type 3/8 Inc.
Validation method	Standard Probe 1 in. and 1/2 in. Sampling Nozzle

Valibration Conditions and Equipment

Digital Calipers	CD-15APX
Reference No.	A22070181
Digital Inclinator	BASELINE
Reference No.	FEI 12-1057
Temperatute	24.4 °C±3
Barometric Pressure	758.3 mm Hg



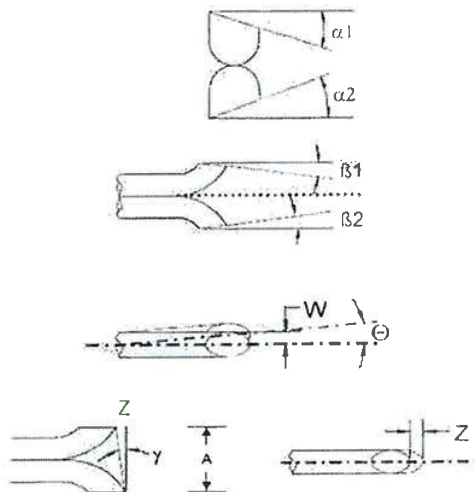
Sampling Probe Validation with Tune up

☒ Measure and Alinment with 1/2" Sampling Nozzle(12.7 mm)

Measured	Standard Range
$L_1 = 1.90 \text{ cm.}$	(1.905 cm, or 3/4 in.)
$L_2 = 5.03 \text{ cm.}$	(5.08 cm. or 2.0 in.)
$D_T = 0.955 \text{ cm.}$	(3/8 in.)
$A = 2.08 \text{ cm.}$	($2.1 D_T \leq A \leq 3D_T$)
$A/2D_T = 1.091 \text{ cm.}$	($1.05 P_A / D_T \leq A \leq 1.5$)

Pitot Tube Validations and Engles measurement Result

☒ : Measure Result after Maintanance and Adjustable



P_B Size	Standard Range
$\alpha_1 = 3.00^\circ$	$\leq 10^\circ$
$\beta_1 = 1.10^\circ$	$\leq 5^\circ$
P_A Size	
$\alpha_2 = 2.20^\circ$	$\leq 10^\circ$
$\beta_2 = -2.00^\circ$	$\leq 5^\circ$

Engles measurement	Calculated Result	Standard Range
$W = -1.10^\circ$	-0.040 cm.	$W < 0.08 \text{ cm (1/32 in.)}$
$Z = 1.10^\circ$	0.040 cm.	$Z < 0.032 \text{ cm (1/8 in.)}$

Can be use 0.84 for $C_p(s)$ if the type of face-opening misalignmet show above with not affect the base line value of $C_p(s)$ Solong as standard range

Validation By:

Approved By:

Date: 28 Feb 23

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Neediss Supply Instrument Co., Ltd.



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Nozzle Validation

Samplig System Equipment Information

Console Model	XC-572-V
Console Number	A2001003
DGM Model	SK25EX
DGM Number	00005796

Validation Conditions

Digital Calipers	CD-15APX
Reference No	A22070181
Temperatute	24.8 °C±3
Barometric Pressure	758.2 mm Hg

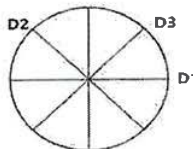
Validation Data					Results	
Nozzle ID	Nozzle Diameter				Different	$(D_1 + D_2 + D_3) / 3$
Sizes		D ₁	D ₂	D ₃	ΔD	D _{avg}
	mm	mm	mm	mm	mm	mm
NS-5	3.96	3.97	3.97	3.97	0.000	3.970
NS-7	5.30	5.00	4.97	4.96	0.021	4.977
NS-9	7.13	7.10	7.10	7.11	0.006	7.103
NS-11	8.71	8.47	8.47	8.53	0.035	8.490
NS-13	10.31	10.31	10.29	10.30	0.010	10.300
NS-15	11.88	11.80	11.79	11.79	0.006	11.793
NS-17	13.48	13.48	13.49	13.49	0.006	13.487

Where :

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

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

D avg = $(D_1 + D_2 + D_3) / 3$



Validation By:



Approved By:



Date: 28 Feb 23

 **neediss**
Neediss Supply Instrument Co.,Ltd.



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



neediss

บริษัท นีดีส ซัพพลาย อินสตรูमेंท์ จำกัด
Neediss Supply Instrument Co., Ltd.

536 ซอยบางเขน 7 แขวงบางเขน เขตบางเขน กรุงเทพฯ 10160 536 Soi Bangkhoe 7 Bangkhoe Bangkok Bangkok
Tel 02-802-3780-2 Fax 02-802-3788 Email: info@neediss.com



Verification Test Report

Page:1/2

Instruments Information

Analyzer Type:	Flue Gas Analyser	Manufacturer:	MRU
Model:	Optima7	S/N:	319178

Calibration Gas information

Calibrator Unit	Standard Gas Mid Range	Standard Gas High Range
ZERO AIR Gen:	O2 Conc 7.79 %vol.	O2 Conc 17.65 %vol.
Ecotech8301	Cd/Ex: GN0025075/Aug 3,2028	Cd/Ex: Gn0025056/Aug 3,2028
Dilutor Model:	CO Conc 4500 ppm	CO Conc 593.9 ppm
EcotechGasCal1100	NO Conc 44.62 ppm	NO Conc 198.6 ppm
	NOX Conc 44.68 ppm	NOX Conc 198.6 ppm
	SO2 Conc 45.34 ppm	SO2 Conc 201.8 ppm
	Cd/Ex: EB0140762/Feb 19,2024	Cd/Ex: GN0016961/Feb 22,2029

Environment: Temperature 25.4 °C

Humidity: 76 %RH

SO2 calibration test

Before Adj					Reading (After Adj)
Set point	Std.gas (ppm)	Reading (ppm)	Difference	% error	Reading (ppm)
Low/Zero	0.0	0	0.0	0.0	0
Mid	45.34	42	-3.3	-7.4	46
Hight	201.8	172	-29.8	-14.8	201

NO calibration test

Before Adj					Reading (After Adj)
Set point	Std.gas (ppm)	Reading (ppm)	Difference	% error	Reading (ppm)
Low/Zero	0.0	0	0.0	0.0	0
Mid	44.62	37	-7.6	-17.1	45
Hight	198.6	172	-26.6	-13.4	199

NOX calibration test

Before Adj					Reading (After Adj)
Set point	Std.gas (ppm)	Reading (ppm)	Difference	% error	Reading (ppm)
Low/Zero	0.0	0	0.0	0.0	0
Mid	44.8	40.0	-4.8	-10.7	45
Hight	198.6	174.0	-24.6	-12.4	202



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ผู้จัดการฝ่ายควบคุมคุณภาพ



Verification Test Report

Page:2/2

Instruments Information

Analyzer Type:	Flue Gas Analyser	Manufacturer:	MRU
Model:	Optima7	S/N:	319178

Calibration Gas information

Calibrator Unit	Standard Gas Mid Range	Standard Gas High Range
ZERO AIR Gen:	O2 Conc 7.79 %vol.	O2 Conc 17.65 %vol.
Ecotech8301	Cd/Ex: GN0025075/Aug 3,2028	Cd/Ex: Gn0025056/Aug 3,2028
Dilutor Model:	CO Conc 4500 ppm	CO Conc 593.9 ppm
EcotechGasCal1100	NO Conc 44.62 ppm	NO Conc 198.6 ppm
	NOX Conc 44.68 ppm	NOX Conc 198.6 ppm
	SO2 Conc 45.34 ppm	SO2 Conc 201.8 ppm
	Cd/Ex: EB0140762/Feb 19,2024	Cd/Ex: GN0016961/Feb 22,2029

Environment: Temperature 25.4 °C Humidity: 76 %RH

CO calibration test					
Before Adj					Reading (After Adj)
Set point	Std.gas (ppm)	Reading (ppm)	Difference	% error	Reading (ppm)
Low/Zero	0.0	0.0	0.0	0.0	0
Mid	593.9	539.0	-54.9	-9.2	596
Hight	4500	4137	-363.0	-8.1	4484

O2 calibration test					
Before Adj					Reading (After Adj)
Set point	Std.gas (ppm)	Reading (ppm)	Difference	% error	Reading (ppm)
Low/Zero	0.0	0	0.0	0.0	-
Mid	7.79	7.4	-0.4	-5.0	7.4
Hight	17.65	17.6	0.0	-0.3	17.6



Neediss Supply Instrument Co.,Ltd.

Calibrate By :



Approve By :



Date: 11 May 22

Date: 11-May-2022

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รับรองสถานะผู้ทดสอบ
ผู้จัดการฝ่ายควบคุมคุณภาพ

Certificate of Calibration

Certificate No. : 66-200035-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.
540, 540/1 Soi Bangkhae 7, Bangkhae, Bangkok 10160

Equipment : Electronic Balance
Manufacturer : Sartorius Model : SECURA224-1S
Serial No. : 0034803270 ID No. : ELABBALANCEN04
Capacity : 220 g Resolution : 0.0001 g

Environment : On site calibration was carried out at the Balance Room, Envilab Co., Ltd.
Ambient Temperature : (23.4 to 23.7) °C
Relative Humidity : (61.4 to 62.8) %
Air Pressure : 1011.0 mbar

Date of Received : 02 February 2023

Date of Calibration : 02 February 2023

Date of Issue : 04 February 2023

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	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. : 66-200035-1

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	0.0001	0.00011
0.1	0.0001	0.00011
1	0.0000	0.00011
2	0.0001	0.00011
5	0.0000	0.00012
10	0.0000	0.00011
20	0.0000	0.00013
50	0.0001	0.00014
100	0.0000	0.00020
200	-0.0001	0.00038

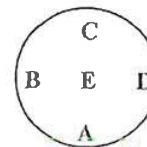
This result of calibration was found accurate as shown on date and place of calibration only.

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	0.0000	-0.0001	0.0000	g



Repeatability

Load test : 200 g

Stdév. : 0.00000 g

- o0o -





S K SALES AND SERVICE CO.,LTD.

194/56, 194/57 Thakham Rd. Samae Dam

Bang Khun Thian Bangkok 10150

Tel. : 02-417-2144 Fax : 02-417-2155



Certificate of Calibration

Reference No. : 4182/2202-017 Certificate No. : L2203-290
Customer : Envilab Co., Ltd. (Head Office) Page 1 of 2
: 540, 540/1 Soi Bangkhao 7, Bangkhao,
: Bangkhao Bangkok 10160
Equipment : Digital Thermo-Hygrometer
Manufacturer : Testo
Model : 608-H1
Serial No. : 83353607
ID No. : -
Received Date : 7 March 2022
Calibrated Date : 9 March 2022
Issued Date : 15 March 2022

Environment	Start Calibration	Stop Calibration
Ambient Temperature (°C)	24.7	25.5
Relative Humidity (% RH)	51	52

Calibrated by : Mr. Nattawut Reangdech

Calibration Method

In-house method : by comparison with standard hygrometer for humidity measurement function
and comparison with standard thermometer for temperature measurement function into humidity/temperature chamber

Condition of this result of calibration

1. Reference standard instrument

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Hygrometer	HL-NT2-D	61468576	QR21-0851	13 May 22
2) Digital Thermometer With Probe	GT11	08000089	PSL-T 0072/65	14 November 2022

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

3. This certificate can be traceable to International System of Unit :

- Through Thailand Institute of Scientific And Technological Research (TISTR)
- Through Quality Reborn Co.,Ltd.

Approved by :

☐ Mr.Suphachai Saksri ☐ Mr.Phayak Toolit ☒ Miss Tantaraporn Pettong

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

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Envilab Co.,Ltd.

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ

Result of Calibration

Function : Humidity Measurement Reference Temperature at 25 °C

STD Reading (% RH)	UUC Reading (% RH)	UUC Error (% RH)	Measurement Uncertainty (\pm % RH)
50.00	49.0	-1.00	2.3

Function : Temperature Measurement

STD Reading (°C)	UUC Reading (°C)	UUC Error (°C)	Measurement Uncertainty (\pm °C)
25.012	25.0	-0.012	0.35

Resolution : 0.1 (°C) , 0.1 % RH

STD= Standard

UUC= Unit Under Calibration

** End of Calibration Report **



Envislab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Certificate of Calibration

Calibration Certification Information			
Cal. Date: January 18, 2023	Rootsmeter S/N: 438320	Ta: 294 °K	
Operator: Jim Tisch		Pa: 750.1 mm Hg	
Calibration Model #: TE-5025A	Calibrator S/N: 0759		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.3960	3.2	2.00
2	3	4	1	0.9950	6.4	4.00
3	5	6	1	0.8850	8.0	5.00
4	7	8	1	0.8450	8.8	5.50
5	9	10	1	0.6990	12.8	8.00

Data Tabulation					
Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)}$ (y-axis)
0.9961	0.7135	1.4145	0.9957	0.7133	0.8854
0.9918	0.9968	2.0004	0.9915	0.9964	1.2521
0.9897	1.1183	2.2365	0.9893	1.1179	1.3999
0.9886	1.1700	2.3456	0.9883	1.1695	1.4683
0.9833	1.4067	2.8289	0.9829	1.4062	1.7708
QSTD	m=	2.03736	QA	m=	1.27576
	b=	-0.03733		b=	-0.02337
	r=	0.99997		r=	0.99997

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

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

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

CAL

Calibratech Co.,Ltd.

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

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



NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 66-410024-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.
540, 540/1 Soi Bangkhae 7, Bangkhae, Bangkok 10160

Equipment : Digital Thermo-Hygrometer
Manufacturer : Jedto Model : HTC-1
Range Temperature : N/A °C Resolution : 0.1 °C
Range Humidity : N/A %R.H. Resolution : 1 %R.H.
Serial No. : PONPE5852094 ID No. : ELABTMHTC10003

Environment : Ambient Temperature : (23 ± 2) °C
Relative Humidity : (50 ± 15) %

Date of Received : 08 March 2023

Date of Calibration : 09 March 2023

Date of Issue : 09 March 2023

Calibrated by : [Redacted]

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4013 by compared with standard probe sensor humidity/temperature into humidity/temperature chamber.

Reference Standard Instruments : This certification is traceable to the International System of Units
Digital Indicator with Standard Probe Temp&Hum

ID No.	Cert. No.	Due Date	Traceability
400034 & 400036	SG-H-00021/66	11 Jul 2023	Success Gateway Co., Ltd., Accredited by TISI Calibration No.0268

Approved by [Redacted]

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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CAL-F0031-03



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

CAL

Calibratech Co.,Ltd.

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

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

Certificate of Calibration

Certificate No. : 66-410024-1

Page : 2 of 2

UUC Condition As-Received : Good

Result of Calibration : Without Adjustment

Function : Temperature measurement

Reference Humidity @ 50 %R.H.

Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (±°C)
25.01	25.0	0.0	0.46

Result of Calibration : Without Adjustment

Function : Humidity measurement

Reference Temperature @ 25 °C

Standard Humidity (%R.H.)	UUC Reading (%R.H.)	Correction (%R.H.)	Uncertainty (±%R.H.)
50.00	49	1	2.2

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%

- ๐0๐ -



Certificate of Calibration

Calibration Certification Information			
Cal. Date: January 18, 2023	Rootsmeter S/N: 438320	Ta: 294 °K	
Operator: Jim Tisch		Pa: 750.1 mm Hg	
Calibration Model #: TE-5025A	Calibrator S/N: 0759		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.3960	3.2	2.00
2	3	4	1	0.9950	6.4	4.00
3	5	6	1	0.8850	8.0	5.00
4	7	8	1	0.8450	8.8	5.50
5	9	10	1	0.6990	12.8	8.00

Data Tabulation					
Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)}$ (y-axis)
0.9961	0.7135	1.4145	0.9957	0.7133	0.8854
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0.9833	1.4067	2.8289	0.9829	1.4062	1.7708
QSTD	m=	2.03736	QA	m=	1.27576
	b=	-0.03733		b=	-0.02337
	r=	0.99997		r=	0.99997

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

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

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



CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E04NI99E15A00V3 Reference Number: 160-402021734-1
Cylinder Number: EB0140762 Cylinder Volume: 144.4 Cubic Feet
Laboratory: 124 - Plumsteadville - PA Cylinder Pressure: 2015 PSIG
PGVP Number: A12021 Valve Outlet: 660
Gas Code: CO,NO,NOX,SO2,BALN Certification Date: Feb 19, 2021

Expiration Date: Feb 19, 2024

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	45.00 PPM	44.68 PPM	G1	+/- 1.4% NIST Traceable	02/12/2021, 02/19/2021
NITRIC OXIDE	45.00 PPM	44.62 PPM	G1	+/- 1.4% NIST Traceable	02/12/2021, 02/19/2021
SULFUR DIOXIDE	45.00 PPM	45.34 PPM	G1	+/- 1.1% NIST Traceable	02/12/2021, 02/19/2021
CARBON MONOXIDE	4500 PPM	4500 PPM	G1	+/- 1.0% NIST Traceable	02/15/2021
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	200611-04	CC707968	49.82 PPM NITRIC OXIDE/NITROGEN	+/-1.0%	Feb 02, 2025
PRM	12386	D685025	9.91 PPM AIR/NITROGEN DIOXIDE	2.0%	Feb 20, 2020
GMIS	124206889	CC323707	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1%	Aug 15, 2021
NTRM	0141709	KAL003190	49.67 PPM SULFUR DIOXIDE/NITROGEN	+/- 1.0%	Jun 20, 2022
NTRM	08012341	KAL004716	4857 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jun 07, 2024

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS ULTRAMAT 6 N1KD579	NDIR	Jan 27, 2021
Nicolet iS50 FTIR AUP2010245 NO	FTIR	Feb 11, 2021
Nicolet iS50 FTIR AUP2010245 NO2	FTIR	Jan 21, 2021
Nicolet iS50 FTIR AUP2010245 SO2	FTIR	Jan 21, 2021

Triad Data Available Upon Request

NOTES:

Gross Weight: 28.4 Kg
Net Weight: 4.5 Kg
PO# 5221000405



Approved for Release

Page 1 of 160-402021734-1



รับรองสารเคมีทุกชนิด
ผู้จัดการฝ่ายควบคุมคุณภาพ

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E04NI99E15A00V3	Reference Number:	160-402021734-1
Cylinder Number:	EB0140762	Cylinder Volume:	144.4 Cubic Feet
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2015 PSIG
PGVP Number:	A12021	Valve Outlet:	660
Gas Code:	CO,NO,NOX,SO2,BALN	Certification Date:	Feb 19, 2021

Expiration Date: Feb 19, 2024

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	45.00 PPM	44.68 PPM	G1	+/- 1.4% NIST Traceable	02/12/2021, 02/19/2021
NITRIC OXIDE	45.00 PPM	44.62 PPM	G1	+/- 1.4% NIST Traceable	02/12/2021, 02/19/2021
SULFUR DIOXIDE	45.00 PPM	45.34 PPM	G1	+/- 1.1% NIST Traceable	02/12/2021, 02/19/2021
CARBON MONOXIDE	4500 PPM	4500 PPM	G1	+/- 1.0% NIST Traceable	02/15/2021
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	200611-04	CC707968	49.82 PPM NITRIC OXIDE/NITROGEN	+/-1.0%	Feb 02, 2025
PRM	12386	D685025	9.91 PPM AIR/NITROGEN DIOXIDE	2.0%	Feb 20, 2020
GMIS	124206889	CC323707	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1%	Aug 15, 2021
NTRM	0141709	KAL003190	49.67 PPM SULFUR DIOXIDE/NITROGEN	+/- 1.0%	Jun 20, 2022
NTRM	08012341	KAL004716	4857 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jun 07, 2024

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS ULTRAMAT 6 N1KD579	NDIR	Jan 27, 2021
Nicolet iS50 FTIR AUP2010245 NO	FTIR	Feb 11, 2021
Nicolet iS50 FTIR AUP2010245 NO2	FTIR	Jan 21, 2021
Nicolet iS50 FTIR AUP2010245 SO2	FTIR	Jan 21, 2021

Triad Data Available Upon Request

NOTES:

Gross Weight: 28.4 Kg
Net Weight: 4.5 Kg
PO# 5221000405



Approved for Release





THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-65/0383

MTC No. EEL. BP. 59/0365

CALIBRATION CERTIFICATE

Submitted by : Envilab Co.,Ltd.

Address : 540, 540/1 Soi Bangkhae 7, Bangkhae, Bangkok, 10160, Thailand.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
: Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Acoustic Calibrator

Manufacturer : Bruel&Kjaer

Model : 4230

Serial No. : 1351075

Ambient Environment

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

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

Ambient Pressure : $(101.325 \pm 1.500) \text{ kPa}$

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

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

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

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

Date of Receipt : 10 Mar. 2022

Date of Calibration : 21 Mar. 2022

1 / 2

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

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

FM.BL.MTC.002 Rev.4

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E-mail : sumalee@tistr.or.th



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-65/0383

MTC No. EEL. BP. 59/0365

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

Nominal Output of Unit Under Test = 94 dB re 20 μ Pa at 1000 HzAcoustic Output in dB re 20 μ Pa, Corrected to Reference Conditions: 101.325 kPa, 23.0 °C and 50 %RH.

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	93.66	-0.34	± 0.10	± 0.40 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	997.8	-2.2	± 1.5	$\pm 1.0\%$

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	1.55	± 0.50	$\pm 3.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :



Approved by :



Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 21 Mar. 2022

Date of Issue : 22 Mar. 2022

Ref : 2011265031501147002

End of Certificate

2 / 2

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

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รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Certificate of Calibration

Certificate Number : SPR22030405-1

Page : 1 of 3

Customer : Envilab Co., Ltd.

540, 540/1 Soi Bangkhae 7, Bangkhae, Bangkhae Bangkok 10160

Equipment Name : Sound Level Meter

Manufacturer : Pulsar

Model : 44

Serial Number : PN1807

ID. Number : N/A

Environmental Conditions

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

Received Date : 25 Mar 2022

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

Calibration Date : 29 Mar 2022

Location of Calibration : In-Lab

Recommend Due Date : 29 Mar 2023

Calibration Procedure : SP-CPE-04-01

Date of Issue : 30 Mar 2022

Method of Calibration

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

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

Calibrated by : 

Approved by : 

Calibration Officer

Authorized Signatory

SP-FM-04-15 rev.0



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Calibration Report

Certificate Number : SPR22030405-1

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	SC-942	B014059	EEL.BP. 34/1264	22 Dec 2022

Traceability

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

TISTR - Thailand Institute of Scientific and Technological Research





Result of Calibration

Certificate No. : SPR22030405-1

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	94.1	94.1	0.1	0.1	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	94.1	94.1	0.1	0.1	0.15
114	114.1	114.1	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 -





THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0381

MTC No. EEL. BP. 70/0366

CALIBRATION CERTIFICATE

Submitted by : Envilab Co., Ltd.

Address : 540, 540/1 Soi Bangkhae 7, Bangkhae, Bangkhae, Bangkok 10160.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
: Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Level Calibrator

Manufacturer : Bruel & Kjaer

Model : 4230

Serial No. : 1351075

Ambient Environment

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

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

Ambient Pressure : $(101.325 \pm 1.500) \text{ kPa}$

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

Calibration Procedure: CP-102-04 based on IEC 60942-2003. The sound pressure level of instrument was measured by standard microphone using an insert voltage technique.

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

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

Date of Receipt : 14 Mar. 2023

Date of Calibration : 16 Mar. 2023

1 / 2
W

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

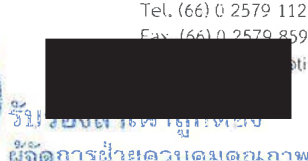
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FM,BL,MTC.002 Rev.4

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0381

MTC No. EEL. BP. 70/0366

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

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

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

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	93.78	-0.22	± 0.10	± 0.40 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	999.0	-1.0	± 1.5	$\pm 1.0\%$

3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	1.05	± 0.50	$\pm 3.0\%$

Note : 1. No adjustment.

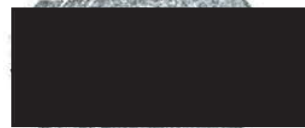
2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :



Approved by :



Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 16 Mar. 2023

Date of Issue : 17 Mar. 2023

Ref : 2011266031401056001

End of Certificate

2 / 2

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

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

FM.BL.MTC.002 Rev.4

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รับรองว่าถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 30 June, 2022

Certification No. 255/22

Page : 1 of 6

Object : เครื่องมือตรวจวัดอุณหภูมิตามวิทยา

Manufacturer : NovaLynx

Type : Data Logger NDWD100

Serial No. : EWSNV110WS2505

Customer : Envilab Co.,Ltd.(Head Office)
540.540/1 Soi Bangkhae 7, Bangkhae, Bangkhae
Bangkok 10160,Thailand.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1003.8 hPa

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 : Standard Velocity at 20 - 30 m/sec

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

Serial Number 110730029 (sensor 120629586)

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

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

: Thermoschneider No.918802

STANDARD BAROMETER : Barometer Vaisala Type PTB220 No. V1220015

Calibrated by :

Sig

Mr

Mechanical Engineer

(Authorised Signatory)

for the Chief

Sub-Standard Instrument



Envilab Co.,Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2505

Certification No. 255/22

30 June, 2022

Page : 2 of 6

Standard Ultrasonic Anemometer	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacuum	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	m/sec	m/sec	m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.4	0.62
5.00	-	-	-	4.7	0.30
7.04	-	-	-	6.9	0.14
9.02	-	-	-	8.9	0.12
11.01	-	-	-	10.9	0.11
13.01	-	-	-	13.1	-0.09
15.01	-	-	-	14.9	0.11
17.02	-	-	-	17.1	-0.08
20.02	-	-	-	20.3	-0.28

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

Calibration

Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau



รับรองมาตรฐาน
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2505

Certification No. 255/22

30 June, 2022

Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
1001.48	1002.42	-0.94
1001.87	1002.92	-1.05
1002.41	1003.79	-1.38
1003.52	1004.67	-1.15
1004.06	1004.96	-0.90
1003.57	1004.38	-0.81
1003.92	1005.54	-1.62
1003.80	1005.22	-1.42
1003.76	1004.96	-1.20
1003.18	1004.67	-1.49
1003.38	1004.96	-1.58
1003.83	1005.54	-1.71
1004.26	1005.83	-1.57
1001.77	1002.92	-1.15
1001.35	1002.92	-1.57
1002.29	1003.50	-1.21
1002.77	1003.92	-1.15
1003.49	1004.50	-1.01
1004.14	1005.25	-1.11
1004.00	1004.79	-0.79

Average

-1.24

Calibrated by :

Mechanical Engineer



Envilab Co.,Ltd.

รับรองสถานะถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2505

Certification No. 255/22

30 June, 2022

Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.7	45.8	-0.1
30.4	30.6	-0.2
15.6	15.7	-0.1

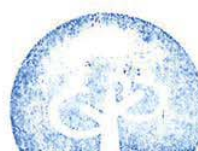
Calibrated by :



Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau



Envilab Co.,Ltd.



รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model EWSNV110WS2505 Certification No. 255/22

30 June, 2022

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading	Correction
	% R.H.	% R.H.
85.20	79	6.2
64.10	60	4.1
45.20	42	3.2

Calibrated by :



Mechanical Engineer



รับรองสำหรับลูกค้า
ผู้จัดการฝ่ายควบคุมคุณภาพ



Date of Issue 30 June,2022

Certification No. 255/22

Page : 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis แบบ TIPPING BUCKET Model 7342.026 ID No.EWSNV110WS2505 ทำการสอบเทียบกับแก้วฝนแบบแก้ว ตวง GAUGE DIAMETER 8.0 INCHES , NEGRETTI & ZAMBRA LONDON No 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.2 mm/ TIP)



ลงชื่อ



วิศวกรชำนาญการ



Envilab Co.,Ltd.

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 30 June, 2022

Certification No. 254/22

Page : 1 of 6

Object : เครื่องมือตรวจวัดอุตุนิยมวิทยา

Manufacturer : NovaLynx

Type : Data Logger NDWD100

Serial No. : EWSNV110WS2506

Customer : Envilab Co.,Ltd.(Head Office)
540.540/1 Soi Bangkhae 7, Bangkhae, Bangkhae
Bangkok 10160,Thailand.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1004.6 hPa

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 : Standard Velocity at 20 - 30 m/sec

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

Serial Number 110730029 (sensor 120629586)

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

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

: Thermoschneider No.918802

STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. V1220015

Calibrated by :

Sig

Mr.

Mechanical Engineer

(Authorised Signatory)

for the Chief

Sub-Standard Instrument



รับรองสำเนาถูกต้อง

บริษัท จำกัด



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2506

Certification No. 254/22

30 June, 2022

Page : 2 of 6

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacumm	Velocity	Velocity	Correction
	inches H2O	inches H2O	m/sec	m/sec	m/sec
1.00	-	-	-	0.7	0.30
3.02	-	-	-	2.8	0.22
5.00	-	-	-	4.9	0.10
7.04	-	-	-	7.1	-0.06
9.02	-	-	-	9.1	-0.08
11.01	-	-	-	10.1	0.91
13.01	-	-	-	13.1	-0.09
15.01	-	-	-	14.9	0.11
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.2	-0.18

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

Calibrated by :

Mr. V

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau



Envilab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2506

Certification No. 254/22

30 June, 2022

Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
1001.48	1002.72	-1.24
1001.87	1003.01	-1.14
1002.41	1003.59	-1.18
1003.52	1004.76	-1.24
1004.06	1005.34	-1.28
1003.57	1004.47	-0.90
1003.92	1004.76	-0.84
1003.80	1004.47	-0.67
1003.76	1004.47	-0.71
1003.18	1003.89	-0.71
1003.38	1004.18	-0.80
1003.83	1004.47	-0.64
1004.26	1005.05	-0.79
1001.77	1002.43	-0.66
1001.35	1002.72	-1.37
1002.29	1003.30	-1.01
1002.77	1003.59	-0.82
1003.49	1004.18	-0.69
1004.14	1004.76	-0.62
1004.00	1003.30	0.70

Average

-0.83

Calibrated by :

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau



Envilab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2506

Certification No. 254/22

30 June, 2022

Page : 4 of 6

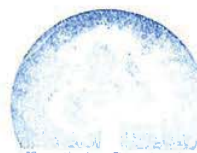
Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.7	45.9	-0.2
30.4	30.6	-0.2
15.6	15.7	-0.1

Calibrated by :



Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau



Envilab Co.,Ltd.



ผู้ตรวจสอบคุณภาพ
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model EWSNV110WS2506 Certification No. 254/22

30 June, 2022

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
85.20	81	4.2
64.10	62	2.1
45.20	44	1.2

Calibrated by :



Mechanical Engineer



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Date of Issue 30 June, 2022

Certification No. 254/22

Page : 6 of 6

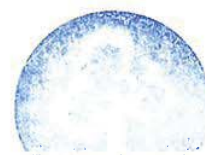
ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis แบบ TIPPING BUCKET Model 7342.026 ID No.EWSNV110WS2506 ทำการสอบเทียบกับแก้วฝนแบบแก้ว ตวง GAUGE DIAMETER 8.0 INCHES , NEGRETTI & ZAMBRA LONDON No 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (-0.2 mm/TIP)



ลงชื่อ

วิศวกรชำนาญการ



Envirolab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue : 1 September, 2022

Certification No. 313/22

Page : 1 of 6

Object : เครื่องมือตรวจวัดอุตุนิยมวิทยา

Manufacturer : NovaLynx

Type : Data Logger 110-WS-25DL-D

Serial No. : EWSNV110WS2509

Customer : Envilab Co.,Ltd.(Head Office)
540.540/1 Soi Bangkhae 7, Bangkhae, Bangkok
Bangkok 10160,Thailand.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1008.7 hPa

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 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)

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

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

: Thermoschneider No.918802

STANDARD BAROMETER : Barometer Vaisala, Type PTB220 No. V1220015

Calibrated by :

Signed

Mr. R

Mechanical Engineer



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2509

Certification No. 313/22

1 September, 2022

Page : 2 of 6

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H2O	Vacuum inches H2O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.6	0.40
7.04	-	-	-	6.9	0.14
9.02	-	-	-	9.0	0.02
11.01	-	-	-	11.1	-0.09
13.01	-	-	-	13.1	-0.09
15.01	-	-	-	15.0	0.01
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.1	-0.08

Wind Aloft Plotting Board.	
US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	89
180	175
270	

Calibrated by :

Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau



Enviro Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model EWSNV110WS2509

Certification No. 313/22

1 September, 2022

Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
1010.31	1009.62	0.69
1010.60	1009.93	0.67
1010.38	1009.86	0.52
1010.23	1009.60	0.63
1009.93	1009.33	0.60
1009.66	1009.07	0.59
1009.41	1008.80	0.61
1009.13	1008.53	0.60
1008.96	1008.27	0.69
1008.58	1008.00	0.58
1008.25	1007.74	0.51
1007.57	1007.20	0.37
1007.27	1006.94	0.33
1007.04	1006.67	0.37
1006.63	1006.40	0.23
1010.02	1009.47	0.55
1008.77	1008.24	0.53
1008.67	1008.17	0.50
1007.63	1007.20	0.43
1007.40	1006.94	0.46

Average

0.52

Calibrated by :

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau



รับรองอำนาจถูกต้อง

Co., Ltd.

ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2509

Certification No. 313/22

1 September, 2022

Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.5	45.5	0.0
30.5	30.5	0.0
15.2	15.4	-0.2

Calibrated by :



Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau



Envilab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model EWSNV110WS2509 Certification No. 313/22

1 September, 2022

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading	Correction
	% R.H.	% R.H.
85.6	81.7	3.9
60.4	57.1	3.3
42.3	38.6	3.7

Calibrated by :



Mechanical Engineer



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Date of Issue 1 September, 2022

Certification No. 313/22

Page : 6 of 6

ใบรับรอง

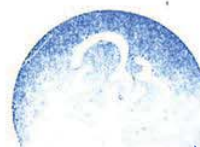
หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis แบบ TIPPING BUCKET
Model 7342.026 ID No.EWSNV110WS2509 ทำการสอบเทียบกับแก้วฝนแบบแก้ว
ตวง GAUGE DIAMETER 8.0 INCHES , NEGRETTI & ZAMBRA LONDON No
71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 มม./TIP)



ลงชื่อ



วิศวกรชำนาญการ



Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue : 1 September, 2022

Certification No. 312/22

Page : 1 of 6

Object : เครื่องมือตรวจวัดอุตุนิยมวิทยา

Manufacturer : NovaLynx

Type : Data Logger 110-WS-25DL-D

Serial No. : EWSNV110WS2510

Customer : Envilab Co.,Ltd.(Head Office)
540.540/1 Soi Bangkhae 7, Bangkhae, Bangkhae
Bangkok 10160,Thailand.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1009.7 hPa

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 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)

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

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

: Thermoschneider No.918802

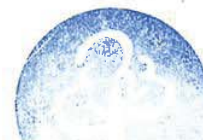
STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. 11220015

Calibrated by :

Si

M

Mechanical Engineer



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2510

Certification No. 312/22

1 September, 2022

Page : 2 of 6

Standard Ultrasonic Anemometer	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure m/sec	Vacumm inches H2O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.6	0.40
7.04	-	-	-	7.1	-0.06
9.02	-	-	-	9.1	-0.08
11.01	-	-	-	10.7	0.31
13.01	-	-	-	12.8	0.21
15.01	-	-	-	14.8	0.21
17.02	-	-	-	17.1	-0.08
20.02	-	-	-	20.3	-0.28

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

Calibrated by :

Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau



บริษัท อีนิค จำกัด
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model EWSNV110WS2510

Certification No. 312/22

1 September, 2022

Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
1010.31	1009.82	0.49
1010.60	1010.36	0.24
1010.38	1010.09	0.29
1010.23	1009.82	0.41
1009.93	1009.56	0.37
1009.66	1009.29	0.37
1009.41	1009.03	0.38
1009.13	1008.76	0.37
1008.96	1008.76	0.20
1008.58	1008.49	0.09
1008.25	1008.23	0.02
1007.57	1007.43	0.14
1007.27	1007.16	0.11
1007.04	1006.90	0.14
1006.63	1006.63	0.00
1010.02	1009.82	0.20
1008.77	1008.49	0.28
1008.67	1008.23	0.44
1007.63	1007.70	-0.07
1007.40	1007.43	-0.03

Average

Calibrated by :

Mechanical Engineer



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2510

Certification No. 312/22

1 September, 2022

Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.5	45.7	-0.2
30.5	30.4	0.1
15.2	15.5	-0.3

Calibrated by :



Mechanical Engineer



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model EWSNV110WS2510 Certification No. 312/22

1 September, 2022

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading	Correction
	% R.H.	% R.H.
85.6	82.1	3.5
60.4	56.7	3.7
42.3	38.7	3.6

Calibrated by :



Mechanical Engineer



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Date of Issue 1 September, 2022

Certification No. 312/22

Page : 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis แบบ TIPPING BUCKET
Model 7342.026 ID No.EWSNV110WS2510 ทำการสอบเทียบกับแก้วฝนแบบแก้ว
ตวง GAUGE DIAMETER 8.0 INCHES , NEGRETTI & ZAMBRA LONDON No
71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.2 mm/ TIP)



ลงชื่อ

น

วิศวกรชำนาญการ



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 1 September, 2022

Certification No. 311/22

Page : 1 of 6

Object : เครื่องมือตรวจวัดอุตุนิยมวิทยา

Manufacturer : NovaLynx

Type : Data Logger 110-WS-25DL-D

Serial No. : EWSNV110WS2508

Customer : Envilab Co.,Ltd.(Head Office)
540.540/1 Soi Bangkhae 7, Bangkhae, Bangkhae
Bangkok 10160,Thailand.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1010.1 hPa

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 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)

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

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

: Thermoschneider No.918802

STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. 1220015

Calibrated by :

Sig

M

Mechanical Engineer



รับรองสำเนาถูกต้อง
Envilab Co.,Ltd. ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2508

Certification No. 311/22

1 September, 2022

Page : 2 of 6

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches	Vacumm inches	Pressure hPa	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	3.1	-0.08
5.00	-	-	-	5.2	-0.20
7.04	-	-	-	7.4	-0.36
9.02	-	-	-	9.0	0.02
11.01	-	-	-	11.1	-0.09
13.01	-	-	-	13.0	0.01
15.01	-	-	-	15.2	-0.19
17.02	-	-	-	17.2	-0.18
20.02	-	-	-	20.5	-0.48

Wind Aloft Plotting Board.	
US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	87
180	179
270	

Calibrated by :

Mr.

Mechanical Engineer





THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2508

Certification No. 311/22

1 September, 2022

Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
1010.31	1009.62	0.69
1010.60	1010.15	0.45
1010.38	1009.89	0.49
1010.23	1009.62	0.61
1009.93	1009.35	0.58
1009.66	1009.03	0.63
1009.41	1009.09	0.32
1009.13	1008.82	0.31
1008.96	1008.56	0.40
1008.58	1008.29	0.29
1008.25	1008.02	0.23
1007.57	1007.23	0.34
1007.27	1006.96	0.31
1007.04	1006.69	0.35
1006.63	1006.43	0.20
1010.02	1009.62	0.40
1008.77	1008.29	0.48
1008.67	1008.02	0.65
1007.63	1007.23	0.40
1007.40	1006.96	0.44

Average

Calibrated by :

Mechanical Engineer



Envilab Co., Ltd.

บริษัท อีนิลแลบ จำกัด
ผู้จัดการฝ่ายควบคุมคุณภาพ





THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2508

Certification No. 311/22

1 September, 2022

Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.5	45.4	0.1
30.5	30.5	0.0
15.2	15.4	-0.2

Calibrated by : . . .



Mechanical Engineer



บริษัท อีนิแล็บ จำกัด
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model EWSNV110WS2508 Certification No. 311/22

1 September, 2022

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading	Correction
	% R.H.	% R.H.
85.6	81.2	4.4
60.4	56.8	3.6
42.3	39.7	2.6

Calibrated by:



Mechanical Engineer



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Date of Issue 1 September, 2022

Certification No. 311/22

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ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis แบบ TIPPING BUCKET Model 7342.026 ID No.EWSNV110WS2508 ทำการสอบเทียบกับแก้วฝนแบบแก้ว ตวง GAUGE DIAMETER 8.0 INCHES , NEGRETTI & ZAMBRA LONDON No 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องวัด (0.2 mm, RIP)



ลงชื่อ

น

วิศวกรชำนาญการ



รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 30 June, 2022

Certification No. 255/22

Page : 1 of 6

Object : เครื่องมือตรวจวัดอุตุนิยมวิทยา

Manufacturer : NovaLynx

Type : Data Logger NDWD100

Serial No. : EWSNV110WS2505

Customer : Envilab Co.,Ltd.(Head Office)
540.540/1 Soi Bangkhae 7, Bangkhae, Bangkhae
Bangkok 10160,Thailand.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1003.8 hPa

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 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)

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

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

: Thermoschneider No.918802

STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. V1220015

Calibrated by :



Mechanical Engineer

S
M



(Authorised Signatory)

for the Chief

ard Instrument

รับรองสาขาถูกต้อง

ด้วยความละเอียด



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2505

Certification No. 255/22

30 June, 2022

Page : 2 of 6

Standard Ultrasonic Anemometer	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacuum	Velocity	Velocity	Correction
	m/sec inches H2O	m/sec inches H2O	m/sec	m/sec	m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.4	0.62
5.00	-	-	-	4.7	0.30
7.04	-	-	-	6.9	0.14
9.02	-	-	-	8.9	0.12
11.01	-	-	-	10.9	0.11
13.01	-	-	-	13.1	-0.09
15.01	-	-	-	14.9	0.11
17.02	-	-	-	17.1	-0.08
20.02	-	-	-	20.3	-0.28

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

Calibrated by :



Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2505

Certification No. 255/22

30 June, 2022

Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
1001.48	1002.42	-0.94
1001.87	1002.92	-1.05
1002.41	1003.79	-1.38
1003.52	1004.67	-1.15
1004.06	1004.96	-0.90
1003.57	1004.38	-0.81
1003.92	1005.54	-1.62
1003.80	1005.22	-1.42
1003.76	1004.96	-1.20
1003.18	1004.67	-1.49
1003.38	1004.96	-1.58
1003.83	1005.54	-1.71
1004.26	1005.83	-1.57
1001.77	1002.92	-1.15
1001.35	1002.92	-1.57
1002.29	1003.50	-1.21
1002.77	1003.92	-1.15
1003.49	1004.50	-1.01
1004.14	1005.25	-1.11
1004.00	1004.79	-0.79

Average

-1.24

Calibrated by :

Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau



รับรองสำเนาถูกต้อง
Co., Ltd. ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2505

Certification No. 255/22

30 June, 2022

Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.7	45.8	-0.1
30.4	30.6	-0.2
15.6	15.7	-0.1

Calibrated by : [REDACTED]

Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau



Co., Ltd.

[REDACTED]
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model EWSNV110WS2505 Certification No. 255/22

30 June, 2022

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading	Correction
	% R.H.	% R.H.
85.20	79	6.2
64.10	60	4.1
45.20	42	3.2

Calibrated by :



Mechanical Engineer



รับรองและดูแลรักษา
ผู้จัดการฝ่ายควบคุมคุณภาพ



Date of Issue 30 June,2022

Certification No. 255/22

Page : 6 of 6

ใบรับรอง

หนังสือฉบับนี้รับรองว่า เครื่องวัดฝน ยี่ห้อ Davis แบบ TIPPING BUCKET Model 7342.026 ID No.EWSNV110WS2505 ทำการสอบเทียบกับแก้วฝนแบบแก้ว ตวง GAUGE DIAMETER 8.0 INCHES , NEGRETTI & ZAMBRA LONDON No 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.2 mm/ TIP)



ลงชื่อ



วิศวกรชำนาญการ



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 30 June, 2022

Certification No. 254/22

Page : 1 of 6

Object : เครื่องมือตรวจวัดอุตุนิยมวิทยา

Manufacturer : NovaLynx

Type : Data Logger NDWD100

Serial No. : EWSNV110WS2506

Customer : Envilab Co.,Ltd.(Head Office)
540.540/1 Soi Bangkhuae 7, Bangkhuae, Bangkhuae
Bangkok 10160,Thailand.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1004.6 hPa

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 : Standard Velocity at 20 - 30 m/sec

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

Serial Number 110730029 (sensor 120629586)

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

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

: Thermoschneider No.918802

STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. V1220015

Calibrated by :

S

M

Mechanical Engineer

(Authorised Signatory)

for the Chief

Sub-Standard Instrument



รับรองสำเนาถูกต้อง
Envilab Co.,Ltd. ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2506

Certification No. 254/22

30 June, 2022

Page : 2 of 6

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H2O	Vacuum inches H2O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.7	0.30
3.02	-	-	-	2.8	0.22
5.00	-	-	-	4.9	0.10
7.04	-	-	-	7.1	-0.06
9.02	-	-	-	9.1	-0.08
11.01	-	-	-	10.1	0.91
13.01	-	-	-	13.1	-0.09
15.01	-	-	-	14.9	0.11
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.2	-0.18

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

Calibrated by

Mr.

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau

รับรองสำเนาถูกต้อง
ผู้ตรวจสอบควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2506

Certification No. 254/22

30 June, 2022

Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
1001.48	1002.72	-1.24
1001.87	1003.01	-1.14
1002.41	1003.59	-1.18
1003.52	1004.76	-1.24
1004.06	1005.34	-1.28
1003.57	1004.47	-0.90
1003.92	1004.76	-0.84
1003.80	1004.47	-0.67
1003.76	1004.47	-0.71
1003.18	1003.89	-0.71
1003.38	1004.18	-0.80
1003.83	1004.47	-0.64
1004.26	1005.05	-0.79
1001.77	1002.43	-0.66
1001.35	1002.72	-1.37
1002.29	1003.30	-1.01
1002.77	1003.59	-0.82
1003.49	1004.18	-0.69
1004.14	1004.76	-0.62
1004.00	1003.30	0.70

Average

-0.83

Calibrated

Mr

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau



รับรองสำเนาถูกต้อง
ผู้อำนวยการศูนย์อุตุนิยมวิทยา



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2506

Certification No. 254/22

30 June, 2022

Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading	Correction
	°C	°C
45.7	45.9	-0.2
30.4	30.6	-0.2
15.6	15.7	-0.1

Calibrated by :



Mechanical Engineer



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model EWSNV110WS2506 Certification No. 254/22

30 June, 2022

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading	Correction
	% R.H.	% R.H.
85.20	81	4.2
64.10	62	2.1
45.20	44	1.2

Calibrated by :



Mechanical Engineer



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Date of Issue 30 June,2022

Certification No. 254/22

Page : 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis แบบ TIPPING BUCKET Model 7342.026 ID No.EWSNV110WS2506 ทำการสอบเทียบกับแก้วฝนแบบแก้ว ตวง GAUGE DIAMETER 8.0 INCHES , NEGRETTI & ZAMBRA LONDON No 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (- 0.2 mm/ TIP)



ลงชื่อ

น

วิศวกรชำนาญการ



กรมโรงงานอุตสาหกรรม
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 2 September, 2022

Certification No. 314/22

Page : 1 of 6

Object : เครื่องมือตรวจวัดอุณหภูมิตามวิทยา

Manufacturer : NovaLynx

Type : Data Logger 110-WS-25DL-D

Serial No. : EWSNV110WS2507

Customer : Envilab Co.,Ltd.(Head Office)
540.540/1 Soi Bangkhuae 7, Bangkhuae, Bangkhuae
Bangkok 10160,Thailand.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1009.6 hPa

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 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)

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

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

: Thermoschneider No.918802

STANDARD BAROMETER : Barometer Vaisala Type PTB220 No. V1220015

Calibrated by :

M

Mechanical Engineer



รับรองสำเนาถูกต้อง

กรมอุตุนิยมวิทยา



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2507

Certification No. 314/22

2 September, 2022

Page : 2 of 6

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H2O	Vacumm inches H2O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.9	0.10
7.04	-	-	-	7.0	0.04
9.02	-	-	-	8.9	0.12
11.01	-	-	-	11.1	-0.09
13.01	-	-	-	13.2	-0.19
15.01	-	-	-	15.0	0.01
17.02	-	-	-	17.2	-0.18
20.02	-	-	-	20.5	-0.48

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

Calibrated by :

Mr.

Mechanical Engineer



EnviLab Co., Ltd.

ใบรองสำเนาถูกต้อง
โปรดอ่านคู่มือการใช้งาน



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2507

Certification No. 314/22

2 September, 2022

Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
1010.31	1009.89	0.42
1010.60	1010.16	0.44
1010.38	1009.89	0.49
1010.23	1009.63	0.60
1009.93	1009.34	0.59
1009.66	1009.09	0.57
1009.41	1009.09	0.32
1009.13	1008.83	0.30
1008.96	1008.56	0.40
1008.58	1008.29	0.29
1008.25	1008.03	0.22
1007.57	1007.23	0.34
1007.27	1006.96	0.31
1007.04	1006.70	0.34
1006.63	1006.43	0.20
1010.02	1009.63	0.39
1008.77	1008.29	0.48
1008.67	1008.03	0.64
1007.63	1007.50	0.13
1007.40	1007.23	0.17

Average

Calibrated by :

Mechanical Engineer



กรมการควบคุมคุณภาพ
กรมอุตุนิยมวิทยา



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2507

Certification No. 314/22

2 September, 2022

Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.5	45.4	0.1
30.5	30.4	0.1
15.2	15.2	0.0

Calibrated by : ()



Mechanical Engineer



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model EWSNV110WS2507 Certification No. 314/22

2 September, 2022

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading	Correction
	% R.H.	% R.H.
85.6	83.4	2.2
60.4	60.0	0.4
42.3	43.4	-1.1

Calibrated by :



Mechanical Engineer



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Date of Issue 2 September, 2022

Certification No. 314/22

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ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis แบบ TIPPING BUCKET Model 7342.026 ID No.EWSNV110WS2507 ทำการสอบเทียบกับแก้วฝนแบบแก้วตวง GAUGE DIAMETER 8.0 INCHES , NEGRETTI & ZAMBRA LONDON No 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.2 mm/ TIP)



ลงชื่อ



วิศวกรชำนาญการ



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue : 1 September, 2022

Certification No. 313/22

Page : 1 of 6

Object : เครื่องมือตรวจวัดอุตุนิยมวิทยา

Manufacturer : NovaLynx

Type : Data Logger 110-WS-25DL-D

Serial No. : EWSNV110WS2509

Customer : Envilab Co.,Ltd.(Head Office)
540.540/1 Soi Bangkhae 7, Bangkhae, Bangkhae
Bangkok 10160,Thailand.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1008.7 hPa

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 : Standard Velocity at 20 - 30 m/sec

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

Serial Number 110730029 (sensor 120629586)

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

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

: Thermoschneider No.918802

STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. 1220015

Calibrated by :

Sig

Mr

Mechanical Engineer



Co.,Ltd. ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2509

Certification No. 313/22

1 September, 2022

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Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H2O	Vacuum inches H2O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.6	0.40
7.04	-	-	-	6.9	0.14
9.02	-	-	-	9.0	0.02
11.01	-	-	-	11.1	-0.09
13.01	-	-	-	13.1	-0.09
15.01	-	-	-	15.0	0.01
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.1	-0.08

Wind Aloft Plotting Board.	
US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	89
180	175
270	

Calibrated by :

Mechanical Engineer





THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2509

Certification No. 313/22

1 September, 2022

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Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
1010.31	1009.62	0.69
1010.60	1009.93	0.67
1010.38	1009.86	0.52
1010.23	1009.60	0.63
1009.93	1009.33	0.60
1009.66	1009.07	0.59
1009.41	1008.80	0.61
1009.13	1008.53	0.60
1008.96	1008.27	0.69
1008.58	1008.00	0.58
1008.25	1007.74	0.51
1007.57	1007.20	0.37
1007.27	1006.94	0.33
1007.04	1006.67	0.37
1006.63	1006.40	0.23
1010.02	1009.47	0.55
1008.77	1008.24	0.53
1008.67	1008.17	0.50
1007.63	1007.20	0.43
1007.40	1006.94	0.46

Average

Calibrated by :

Mechanical Engineer



กรมอุตุนิยมวิทยา
กรมการตรวจสอบและสอบเทียบ
ศูนย์ตรวจสอบและสอบเทียบเครื่องมืออุตุนิยมวิทยา



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2509

Certification No. 313/22

1 September, 2022

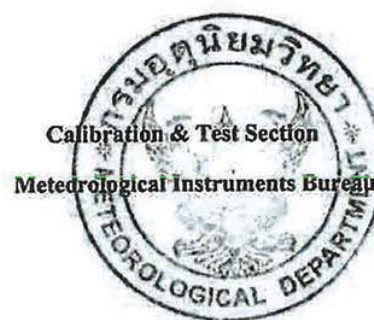
Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.5	45.5	0.0
30.5	30.5	0.0
15.2	15.4	-0.2

Calibrated by :



Mechanical Engineer



รับรองสำเนาถูกต้อง

Co., Ltd.

ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model EWSNV110WS2509 Certification No. 313/22

1 September, 2022

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Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
85.6	81.7	3.9
60.4	57.1	3.3
42.3	38.6	3.7

Calibrated by :



Mechanical Engineer



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Date of Issue 1 September, 2022

Certification No. 313/22

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ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis แบบ TIPPING BUCKET Model 7342.026 ID No.EWSNV110WS2509 ทำการสอบเทียบกับแก้วฝนแบบแก้ว ตวง GAUGE DIAMETER 8.0 INCHES , NEGRETTI & ZAMBRA LONDON No 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 มม./TIP)



ลงชื่อ



วิศวกรชำนาญการ



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue : 1 September, 2022

Certification No. 312/22

Page : 1 of 6

Object : เครื่องมือตรวจวัดอุตุนิยมวิทยา

Manufacturer : NovaLynx

Type : Data Logger 110-WS-25DL-D

Serial No. : EWSNV110WS2510

Customer : Envilab Co.,Ltd.(Head Office)
540.540/1 Soi Bangkhae 7, Bangkhae, Bangkhae
Bangkok 10160,Thailand.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1009.7 hPa

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 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)

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

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

: Thermoschneider No.918802

STANDARD BAROMETER

meter Vaisala Type PTB220 No. V1220015

Calibrated by :

St

M

Mechanical Engineer



รับรองสำเนาถูกต้อง
Envilab Co.,Ltd. ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2510

Certification No. 312/22

1 September, 2022

Page : 2 of 6

Standard Ultrasonic Anemometer	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacumm	Velocity	Velocity	Correction
	m/sec	inches H2O	inches H2O	m/sec	m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.6	0.40
7.04	-	-	-	7.1	-0.06
9.02	-	-	-	9.1	-0.08
11.01	-	-	-	10.7	0.31
13.01	-	-	-	12.8	0.21
15.01	-	-	-	14.8	0.21
17.02	-	-	-	17.1	-0.08
20.02	-	-	-	20.3	-0.28

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

Calibrated by

Mr

Mechanical Engineer



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ
Envilab Co.,Ltd.



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2510

Certification No. 312/22

1 September, 2022

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Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
1010.31	1009.82	0.49
1010.60	1010.36	0.24
1010.38	1010.09	0.29
1010.23	1009.82	0.41
1009.93	1009.56	0.37
1009.66	1009.29	0.37
1009.41	1009.03	0.38
1009.13	1008.76	0.37
1008.96	1008.76	0.20
1008.58	1008.49	0.09
1008.25	1008.23	0.02
1007.57	1007.43	0.14
1007.27	1007.16	0.11
1007.04	1006.90	0.14
1006.63	1006.63	0.00
1010.02	1009.82	0.20
1008.77	1008.49	0.28
1008.67	1008.23	0.44
1007.63	1007.70	-0.07
1007.40	1007.43	-0.03

Average

Calibrated by :

Mr.

Mechanical Engineer



รับรองสำเนาถูกต้อง
สำหรับการเผยแพร่ข้อมูลภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model

EWSNV110WS2510

Certification No. 312/22

1 September, 2022

Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.5	45.7	-0.2
30.5	30.4	0.1
15.2	15.5	-0.3

Calibrated by :



Mr.



Mechanical Engineer



รพรองสาเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Sensor model EWSNV110WS2510 Certification No. 312/22

1 September, 2022

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
85.6	82.1	3.5
60.4	56.7	3.7
42.3	38.7	3.6

Calibrated by :

Mr

Mechanical Engineer



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Date of Issue 1 September, 2022

Certification No. 312/22

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ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis แบบ TIPPING BUCKET
Model 7342.026 ID No.EWSNV110WS2510 ทำการสอบเทียบกับแก้วฝนแบบแก้ว
ตวง GAUGE DIAMETER 8.0 INCHES , NEGRETTI & ZAMBRA LONDON No
71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องวัด (0.2 mm/TIP)



ลงชื่อ



วิศวกรชำนาญการ



Co., Ltd.

รับจ้างสำรวจและ
ผู้จัดการฝ่ายควบคุมคุณภาพ