



ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES

SUB-CONTRACTING REPORT

CONTACT : MR MAGNUM FAN

WORK ORDER : **HK2321491**

CLIENT : **ENVIROTECH SERVICES CO.**

ADDRESS : RM 712, 7/F, MY LOFT 9 HOI WING ROAD,
TUEN MUN, N.T., HK

SUB-BATCH : 1

DATE RECEIVED : 2-JUN-2023

DATE OF ISSUE : 8-JUN-2023

PROJECT : —

NO. OF SAMPLES : 1

CLIENT ORDER : —

General Comments

- No sample is received in this Work Order. The report presents non-laboratory testing data only.
 - Sample information (Project name, Sample ID, Sampling date/time, etc.) is provided by client.
 - Result(s) of sample(s) is/are reported on as received basis, unless otherwise specified. The result(s) is/are related only to the item(s) tested.
 - Calibration was subcontracted to Envirotech Services Company.
-

Signatories

This document has been signed by those names that appear on this report and are the authorised signatories

Signatories

Position

Richard Fung

Managing Director

This report supersedes any previous report(s) with the same work order number.

All pages of this report have been checked and approved for release.

ALS Technichem (HK) Pty Ltd
Part of the **ALS Laboratory Group**

11/F, Chung Shun Knitting Centre 1 - 3 Wing Yip Street Kwai Chung N.T. Hong Kong
Tel. +852 2610 1044 Fax. +852 2610 2021 www.alsglobal.com

WORK ORDER : HK2321491
SUB-BATCH : 1
CLIENT : ENVIROTECH SERVICES CO.
PROJECT : ---



ALS Lab ID	Client's Sample ID	Sample Type	Sample Date	External Lab Report No.
HK2321491-001	SIBATA (476664)	Equipments	25-May-2023	S/N: 476664



Equipment Verification Report (TSP)

Equipment Calibrated:

Type: Laser Dust Monitor
Manufacturer: Sibata LD-3B
Serial No.: 476664
Equipment Ref.: N/A
ALS Job Order: HK2320686

Standard Equipment

Standard Equipment: High Volume Sampler (TSP)
Location & Location ID: Envirotech Room (Calibration Room)
Equipment Ref.: HVS 8162
Last Calibration Date: 26-Apr-2023

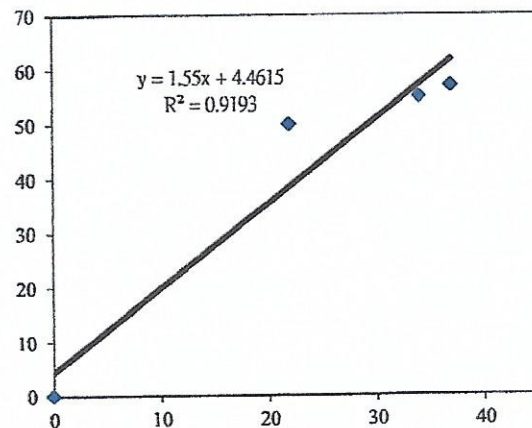
Equipment Verification Results:

Verification Date: 25, 26 & 27 May 2023

Hour	Time	Mean Temp °C	Mean Pressure (hpa)	Concentration in µg/m ³ (Standard Equipment)	Total Count (Calibrated Equipment)	Count /Minute (Total Count/min)
1hr 00mins	1620-1720	27.5	1011.2	57	2199	37
1hr 00mins	1030-1130	28.5	1013.6	55	2010	34
1hr 00mins	0915-1015	28.8	1011.1	50	1338	22

Linear Regression of Y or X

Slope (K-factor): 1.5500(µg/m³)/CPM
Correlation Coefficient (R): 0.9588
Date of Issue: 1-Jun-2023



Remarks:

- Strong Correlation (>0.8)
- Factor 1.5500 (µg/m³)/CPM should be applied for TSP monitoring

*If R<0.5, repair or verification is required for the equipment

Operator: P.F.Yeung Signature *Fai* Date: 01 June 2023

QC Reviewer: K.F.Ho Signature *Fat* Date: 01 June 2023

TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location : Rm. 712, My Loft, Tuen Mun	Date of Calibration:	23-Apr-23
HVS ID: 8162	Next Calibration Date:	23-Jun-23
Name and Model : TISCH HVS Model TE-5170	Operator:	P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1016	Corrected Pressure (mm Hg)	762.1
Temperature (°C)	20.0	Temperature (K)	293

CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.06918
Model:	TE-5025A	Qstd Intercept	-0.04220
Serial#:	2454		

CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	6.5	6.5	13.0	1.781	62	62.63	Slope= 33.351 Intercept= 5.042 Corr. Coeff.= 0.9932
13	4.9	4.9	9.8	1.549	58	58.59	
10	3.7	3.7	7.4	1.348	50	50.51	
7	2.2	2.2	4.4	1.044	40	40.40	
5	1.5	1.4	2.9	0.852	32	32.32	

Calculations:

$$Qstd = 1/m[\text{Sqrt}(H2O(Pa/Pstd)(Tstd/Ta))-b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

For subsequent calculation of sampler flow:

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

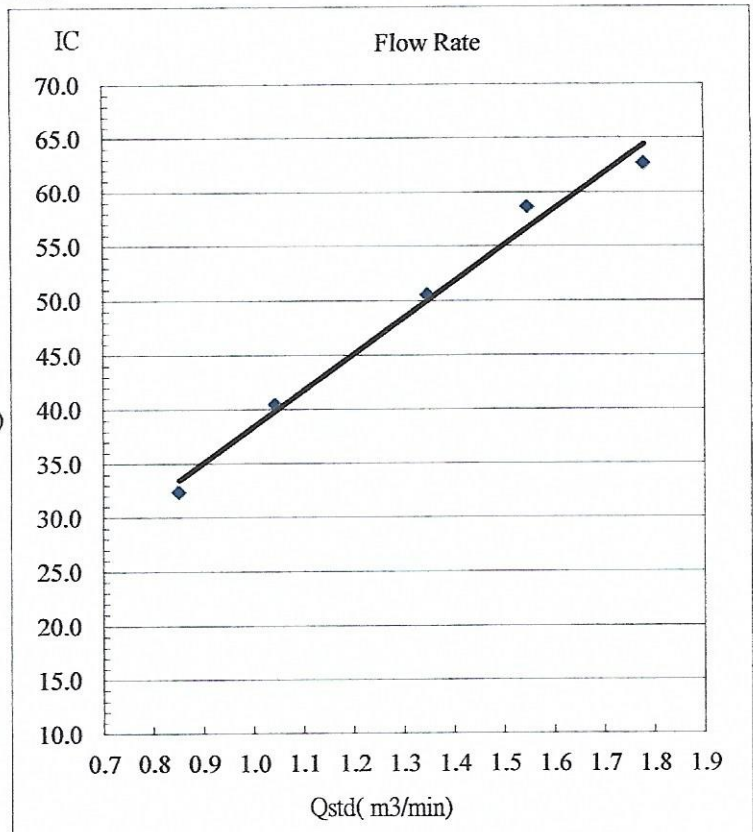
m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure





Certificate of Calibration

Calibration Certification Information			
Cal. Date: December 15, 2022	Rootsmeter S/N: 438320	Ta: 295	°K
Operator: Jim Tisch		Pa: 748.0	mm Hg
Calibration Model #: TE-5025A	Calibrator S/N: 4064		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4430	3.2	2.00
2	3	4	1	1.0210	6.4	4.00
3	5	6	1	0.9170	7.9	5.00
4	7	8	1	0.8730	8.8	5.50
5	9	10	1	0.7210	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)	$\sqrt{\Delta H (Ta/Pa)}$ (y-axis)
0.9900	0.6861	1.4101	0.9957	0.6900	0.8881
0.9858	0.9655	1.9943	0.9914	0.9711	1.2560
0.9838	1.0728	2.2296	0.9894	1.0790	1.4042
0.9826	1.1255	2.3385	0.9882	1.1320	1.4728
0.9772	1.3554	2.8203	0.9829	1.3632	1.7762
QSTD	m=	2.10977	QA	m=	1.32110
	b=	-0.03782		b=	-0.02382
	r=	0.99998		r=	0.99998

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= $1/m \left(\left(\sqrt{\Delta H (Ta/Pa)} \right) - b \right)$

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



SUB-CONTRACTING REPORT

CONTACT : MR MAGNUM FAN
CLIENT : ENVIROTECH SERVICES CO.
ADDRESS : RM 712, 7/F, MY LOFT 9 HOI WING ROAD,
TUEN MUN, N.T., HK

PROJECT : —

WORK ORDER : **HK2312356**

SUB-BATCH : 1
DATE RECEIVED : 31-MAR-2023
DATE OF ISSUE : 11-APR-2023
NO. OF SAMPLES : 1
CLIENT ORDER : —

General Comments

- Sample(s) was/ were submitted by client. Sample(s) arrived laboratory in ambient condition. The result(s) related only to the item(s) tested.
- Sample information (Project name, Sample ID, Sampling date/time, etc.) is provided by client.
- Result(s) of sample(s) is/are reported on as received basis, unless otherwise specified.
- Calibration was subcontracted to and analysed by Envirotech Services Company

Signatories

This document has been signed by those names that appear on this report and are the authorised signatories

Signatories

Position

Richard Fung

Managing Director

This report supersedes any previous report(s) with the same work order number.

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WORK ORDER : HK2312356
SUB-BATCH : 1
CLIENT : ENVIROTECH SERVICES CO.
PROJECT : ---



ALS Lab ID	Client's Sample ID	Sample Type	Sample Date	External Lab Report No.
HK2312356-001	Sibata (6Z7784)	Equipments	18-Mar-2023	S/N: 6Z7784



Equipment Verification Report (TSP)

Equipment Calibrated:

Type: Laser Dust Monitor
Manufacturer: Sibata LD-3B
Serial No.: 6Z7784
Equipment Ref.: N/A
Job Order: HK2311344

Standard Equipment

Standard Equipment: High Volume Sampler (TSP)
Location & Location ID: Envirotech Room (Calibration Room)
Equipment Ref.: HVS 8162
Last Calibration Date: 28-Feb-2023

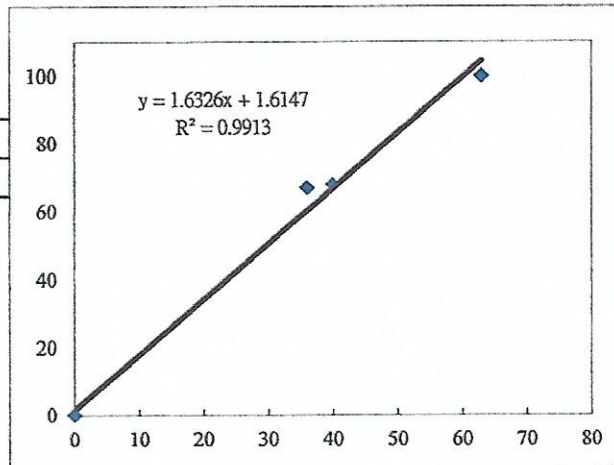
Equipment Verification Results:

Verification Date: 17 & 18 March 2023

Hour	Time	Mean Temp °C	Mean Pressure (hpa)	Concentration in µg/m³ (Standard Equipment)	Total Count (Calibrated Equipment)	Count /Minute (Total Count/min)
1hr 00mins	1410-1510	24.2	1018.2	100	3780	63
1hr 00mins	0810-0910	22.2	1021.5	67	2162	36
1hr 00mins	1510-1610	25.0	1022.4	68	2405	40

Linear Regression of Y or X

Slope (K-factor): 1.6326(µg/m³)/CPM
Correlation Coefficient (R): 0.9956
Date of Issue: 29-Mar-2023



Remarks:

- 1. Strong Correlation (>0.8)
- 2. Factor 1.6326 (µg/m³)/CPM should be applied for TSP monitoring

*If R<0.5, repair or verification is required for the equipment

Operator: P.F.Yeung Signature *Fai* Date: 29 March 2023

QC Reviewer: K.F.Ho Signature *Fat* Date: 29 March 2023

TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location : Rm. 712, My Loft, Tuen Mun	Date of Calibration:	28-Feb-23
HVS ID: 8162	Next Calibration Date:	28-Apr-23
Name and Model : TISCH HVS Model TE-5170	Operator:	K.F.Ho

CONDITIONS

Sea Level Pressure (hpa)	1021	Corrected Pressure (mm Hg)	764.3
Temperature (°C)	22.0	Temperature (K)	295

CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.06918
Model:	TE-5025A	Qstd Intercept	-0.04220
Serial#:	2454		

CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	6.7	6.6	13.3	1.797	62	62.51	Slope= 31.428 Intercept= 5.569 Corr. Coeff.= 0.9990
13	5.2	5.1	10.3	1.584	55	55.45	
10	4.0	3.9	7.9	1.390	48	48.39	
7	2.5	2.5	5.0	1.110	40	40.33	
5	1.4	1.4	2.8	0.836	32	32.26	

Calculations:

$$Qstd = 1/m[\text{Sqrt}(H2O(Pa/Pstd)(Tstd/Ta))-b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

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For subsequent calculation of sampler flow:

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

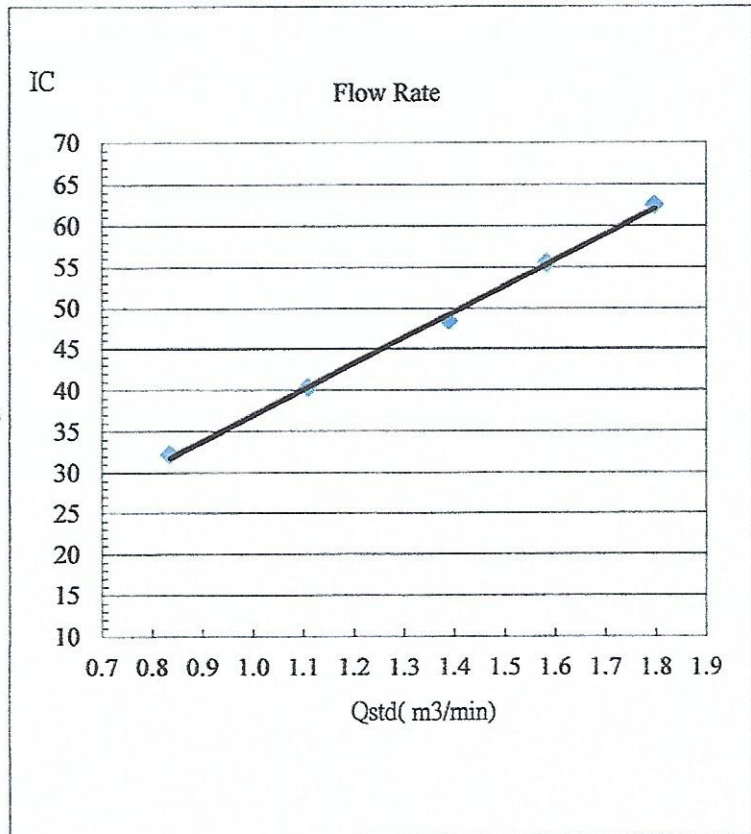
m = sampler slope

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Certificate of Calibration

Calibration Certification Information			
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Operator: Jim Tisch		Pa: 748.0	mm Hg
Calibration Model #: TE-5025A	Calibrator S/N: 4064		

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	r=	0.99998		r=	0.99998

Calculations			
Vstd=	$\Delta Vol((Pa-\Delta P)/Pstd)(Tstd/Ta)$	Va=	$\Delta Vol((Pa-\Delta P)/Pa)$
Qstd=	Vstd/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=	$1/m \left(\left(\sqrt{\Delta H (Ta/Pa)} \right) - b \right)$

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m: slope	

RECALIBRATION
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