AECOM Asia Company Limited

TSP - Total Suspended Particulates Sampler
Field Calibration Report

Station: Kwun Tong Government Secondary School (ID1A)
Operator: Choi Wing Ho
Date: 24-Dec-13
Next Due Date: 24-Feb-14
Pump No.: 763
Verified Against: O.T.S. -- 0988
Equipment No.: A-001-64T
Expiration Date: 20-May-14

Ambient Condition					
Temperature, Ta	289	Kelvin	Pressure, Pa	756.9	mmHg

Orifice Transfer Standard Information					
Equipment No.:	988	Slope, mc	1.94727	Intercept, bc	0.02332
Last Calibration Date:	20-May-13	$mc \times Qstd + bc = [H \times (Pa/760) \times (298/Ta)]^{1/2}$			
Next Calibration Date:	20-May-14				

Calibration of TSP Sampler

Calibration Point	H in. of water	$[H \times (Pa/760) \times (298/Ta)]^{1/2}$	Qstd (m^3/min) **X - axis**	W in. of oil	$[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ **Y-axis**
1	9.0	3.04	1.55	5.8	2.44
2	8.1	2.88	1.47	5.0	2.27
3	6.4	2.56	1.30	3.5	1.90
4	4.3	2.10	1.07	2.2	1.50
5	2.8	1.70	0.86	1.3	1.16

By Linear Regression of Y on X

Slope , mw = **1.8562** **Intercept, bw =** **-0.4662**

Correlation Coefficient* = **0.9980**

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 1.21 m^3/min (43 CFM)

From the Regression Equation, the "Y" value according to

$$m \times Qstd + b = [W \times (Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point $W = (m \times Qstd + b)^2 \times (760 / Pa) \times (Ta / 298) =$ **3.08**

*If Correlation Coefficient < 0.990, check and recalibrate again.

Remarks:

QC Reviewer: YT Leung Signature: Date: 27-12-13

AECOM Asia Company Limited

TSP - Total Suspended Particulates Sampler
Field Calibration Report

Station: On Yat House (ID2)
Date: 24-Dec-13
Pump No.: 1654
Equipment No.: A-001-61T

Operator: Choi Wing Ho
Next Due Date: 24-Feb-14
Verified Against: O.T.S. -- 0988
Expiration Date: 20-May-14

Ambient Condition					
Temperature, Ta	289	Kelvin	Pressure, Pa	756.9	mmHg

Orifice Transfer Standard Information					
Equipment No.:	988	Slope, mc	1.94727	Intercept, bc	0.02332
Last Calibration Date:	20-May-13	$mc \times Qstd + bc = [H \times (Pa/760) \times (298/Ta)]^{1/2}$			
Next Calibration Date:	20-May-14				

Calibration of TSP Sampler

Calibration Point	H in. of water	$[H \times (Pa/760) \times (298/Ta)]^{1/2}$	Qstd (m^3/min) **X - axis**	W in. of oil	$[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ **Y-axis**
1	8.9	3.02	1.54	6.1	2.50
2	6.9	2.66	1.35	4.1	2.05
3	5.4	2.35	1.19	3.0	1.76
4	4.1	2.05	1.04	2.3	1.54
5	2.7	1.67	0.85	1.3	1.16

By Linear Regression of Y on X

Slope , mw = **1.8928** **Intercept, bw =** **-0.4580**

Correlation Coefficient* = **0.9970**

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 1.21 m^3/min (43 CFM)

From the Regression Equation, the "Y" value according to

$$m \times Qstd + b = [W \times (Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point $W = (m \times Qstd + b)^2 \times (760 / Pa) \times (Ta / 298) =$ **3.27**

*If Correlation Coefficient < 0.990, check and recalibrate again.

Remarks:

QC Reviewer: YT Leung Signature: Date: 27-12-13

AECOM Asia Company Limited

TSP - Total Suspended Particulates Sampler
Field Calibration Report

Station: Sau Nga House (ID3)
Date: 24-Dec-13
Pump No.: 1272
Equipment No.: A-001-31T

Operator: Choi Wing Ho
Next Due Date: 24-Feb-14
Verified Against: O.T.S. -- 0988
Expiration Date: 20-May-14

Ambient Condition					
Temperature, Ta	289	Kelvin	Pressure, Pa	756.9	mmHg

Orifice Transfer Standard Information					
Equipment No.:	988	Slope, mc	1.94727	Intercept, bc	0.02332
Last Calibration Date:	20-May-13	$mc \times Qstd + bc = [H \times (Pa/760) \times (298/Ta)]^{1/2}$			
Next Calibration Date:	20-May-14				

Calibration of TSP Sampler

Calibration Point	H in. of water	$[H \times (Pa/760) \times (298/Ta)]^{1/2}$	Qstd (m^3/min) **X - axis**	W in. of oil	$[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ **Y-axis**
1	8.9	3.02	1.54	6.4	2.56
2	7.0	2.68	1.36	4.4	2.13
3	5.6	2.40	1.22	3.5	1.90
4	4.3	2.10	1.07	2.6	1.63
5	3.3	1.84	0.93	1.6	1.28

By Linear Regression of Y on X

Slope , mw = **2.0291** **Intercept, bw =** **-0.5837**

Correlation Coefficient* = **0.9974**

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 1.21 m^3/min (43 CFM)

From the Regression Equation, the "Y" value according to

$$m \times Qstd + b = [W \times (Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point $W = (m \times Qstd + b)^2 \times (760 / Pa) \times (Ta / 298) =$ **3.41**

*If Correlation Coefficient < 0.990, check and recalibrate again.

Remarks:

QC Reviewer: YT Leung Signature: Date: 27-12-13

AECOM Asia Company Limited

TSP - Total Suspended Particulates Sampler
Field Calibration Report

Station: Sau Ming Primary School (ID4)
Date: 18-Dec-13
Pump No.: 1275
Equipment No.: A-001-28T

Operator: Shum Kam Yuen
Next Due Date: 18-Feb-14
Verified Against: O.T.S. -- 0988
Expiration Date: 20-May-14

Ambient Condition					
Temperature, Ta	289	Kelvin	Pressure, Pa	756.9	mmHg

Orifice Transfer Standard Information					
Equipment No.:	988	Slope, mc	1.94727	Intercept, bc	0.02332
Last Calibration Date:	20-May-13	**mc x Qstd + bc = [H x (Pa/760) x (298/Ta)]$^{1/2}$**			
Next Calibration Date:	20-May-14				

Calibration of TSP Sampler

Calibration Point	H in. of water	[H x (Pa/760) x (298/Ta)]$^{1/2}$	Qstd (m^3/min) **X - axis**	W in. of oil	[ΔW x (Pa/760) x (298/Ta)]$^{1/2}$ **Y-axis**
1	9.1	3.06	1.56	6.1	2.50
2	7.6	2.79	1.42	4.8	2.22
3	6.0	2.48	1.26	3.7	1.95
4	4.6	2.17	1.10	3.0	1.76
5	3.3	1.84	0.93	2.0	1.43

By Linear Regression of Y on X

Slope , mw = **1.6440** **Intercept, bw =** **-0.0895**

Correlation Coefficient* = **0.9970**

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 1.21 m^3/min (43 CFM)

From the Regression Equation, the "Y" value according to

m x Qstd + b = [W x (Pa/760) x (298/Ta)]$^{1/2}$

Therefore, Set Point W = (m x Qstd + b)^2 x (760 / Pa) x (Ta / 298) = **3.51**

*If Correlation Coefficient < 0.990, check and recalibrate again.

Remarks:

QC Reviewer: YT Leung Signature: Date: 27-12-13

AECOM Asia Company Limited

TSP - Total Suspended Particulates Sampler
Field Calibration Report

Station: Sau Mau Ping Catholic Primary School (ID5)
Date: 18-Dec-13
Pump No.: 10088
Equipment No.: A-001-13T

Operator: Shum Kam Yuen
Next Due Date: 18-Feb-14
Verified Against: O.T.S. -- 0988
Expiration Date: 20-May-14

Ambient Condition					
Temperature, Ta	289	Kelvin	Pressure, Pa	756.9	mmHg

Orifice Transfer Standard Information					
Equipment No.:	988	Slope, mc	1.94727	Intercept, bc	0.02332
Last Calibration Date:	20-May-13	**mc x Qstd + bc = [H x (Pa/760) x (298/Ta)]$^{1/2}$**			
Next Calibration Date:	20-May-14				

Calibration of TSP Sampler

Calibration Point	H in. of water	[H x (Pa/760) x (298/Ta)]$^{1/2}$	Qstd (m^3/min) **X - axis**	W in. of oil	[ΔW x (Pa/760) x (298/Ta)]$^{1/2}$ **Y-axis**
1	8.8	3.01	1.53	6.2	2.52
2	7.6	2.79	1.42	5.0	2.27
3	5.3	2.33	1.18	3.5	1.90
4	4	2.03	1.03	2.6	1.63
5	2.8	1.70	0.86	1.6	1.28

By Linear Regression of Y on X

Slope , mw = 1.7950 **Intercept, bw =** -0.2412

Correlation Coefficient* = 0.9984

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 1.21 m^3/min (43 CFM)

From the Regression Equation, the "Y" value according to

m x Qstd + b = [W x (Pa/760) x (298/Ta)]$^{1/2}$

Therefore, Set Point W = (m x Qstd + b)^2 x (760 / Pa) x (Ta / 298) = **3.63**

*If Correlation Coefficient < 0.990, check and recalibrate again.

Remarks:

QC Reviewer: Y T Leung Signature: Date: 27-12-13

AECOM Asia Company Limited

TSP - Total Suspended Particulates Sampler
Field Calibration Report

Station: Kwun Tong Government Secondary School (ID1A)
Operator: Leung Yiu Ting
Date: 19-Feb-14
Next Due Date: 19-May-14
Pump No.: 763
Verified Against: O.T.S. -- 0988
Equipment No.: A-001-64T
Expiration Date: 20-May-14

Ambient Condition					
Temperature, Ta	283	Kelvin	Pressure, Pa	766.2	mmHg

Orifice Transfer Standard Information					
Equipment No.:	988	Slope, mc	1.94727	Intercept, bc	0.02332
Last Calibration Date:	20-May-13	**mc x Qstd + bc = [H x (Pa/760) x (298/Ta)]$^{1/2}$**			
Next Calibration Date:	20-May-14				

Calibration of TSP Sampler

Calibration Point	H in. of water	[H x (Pa/760) x (298/Ta)]$^{1/2}$	Qstd (m^3/min) **X - axis**	W in. of oil	[ΔW x (Pa/760) x (298/Ta)]$^{1/2}$ **Y-axis**
1	8.9	3.07	1.56	5.9	2.50
2	8.0	2.91	1.48	5.1	2.33
3	6.2	2.57	1.31	3.5	1.93
4	4.4	2.16	1.10	2.3	1.56
5	2.9	1.75	0.89	1.4	1.22

By Linear Regression of Y on X

Slope , mw = 1.9196 **Intercept, bw =** -0.5260

Correlation Coefficient* = 0.9970

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 1.21 m^3/min (43 CFM)

From the Regression Equation, the "Y" value according to

m x Qstd + b = [W x (Pa/760) x (298/Ta)]$^{1/2}$

Therefore, Set Point W = (m x Qstd + b)^2 x (760 / Pa) x (Ta / 298) = **3.04**

*If Correlation Coefficient < 0.990, check and recalibrate again.

Remarks:

QC Reviewer: HY Sum Signature: Date: 21-2-14

AECOM Asia Company Limited

TSP - Total Suspended Particulates Sampler
Field Calibration Report

Station: On Yat House (ID2)
Date: 19-Feb-14
Pump No.: 1654
Equipment No.: A-001-61T

Operator: Leung Yiu Ting
Next Due Date: 19-May-14
Verified Against: O.T.S. -- 0988
Expiration Date: 20-May-14

Ambient Condition					
Temperature, Ta	283	Kelvin	Pressure, Pa	766.2	mmHg

Orifice Transfer Standard Information					
Equipment No.:	988	Slope, mc	1.94727	Intercept, bc	0.02332
Last Calibration Date:	20-May-13	**mc x Qstd + bc = [H x (Pa/760) x (298/Ta)]$^{1/2}$**			
Next Calibration Date:	20-May-14				

Calibration of TSP Sampler

Calibration Point	H in. of water	[H x (Pa/760) x (298/Ta)]$^{1/2}$	Qstd (m^3/min) **X - axis**	W in. of oil	[ΔW x (Pa/760) x (298/Ta)]$^{1/2}$ **Y-axis**
1	8.7	3.04	1.55	6.0	2.52
2	6.6	2.65	1.35	4.3	2.14
3	5.3	2.37	1.21	3.0	1.78
4	4.2	2.11	1.07	2.4	1.60
5	2.8	1.72	0.87	1.4	1.22

By Linear Regression of Y on X

Slope , mw = 1.9142 **Intercept, bw =** -0.4642

Correlation Coefficient* = 0.9967

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 1.21 m^3/min (43 CFM)

From the Regression Equation, the "Y" value according to

m x Qstd + b = [W x (Pa/760) x (298/Ta)]$^{1/2}$

Therefore, Set Point W = (m x Qstd + b)^2 x (760 / Pa) x (Ta / 298) = **3.23**

*If Correlation Coefficient < 0.990, check and recalibrate again.

Remarks:

QC Reviewer: HY Sum Signature: HY Date: 21-2-14

AECOM Asia Company Limited

TSP - Total Suspended Particulates Sampler
Field Calibration Report

Station: Sau Nga House (ID3)
Date: 19-Feb-14
Pump No.: 1272
Equipment No.: A-001-31T

Operator: Leung Yiu Ting
Next Due Date: 19-May-14
Verified Against: O.T.S. -- 0988
Expiration Date: 20-May-14

Ambient Condition					
Temperature, Ta	283	Kelvin	Pressure, Pa	766.2	mmHg

Orifice Transfer Standard Information					
Equipment No.:	988	Slope, mc	1.94727	Intercept, bc	0.02332
Last Calibration Date:	20-May-13	**mc x Qstd + bc = [H x (Pa/760) x (298/Ta)]$^{1/2}$**			
Next Calibration Date:	20-May-14				

Calibration of TSP Sampler

Calibration Point	H in. of water	[H x (Pa/760) x (298/Ta)]$^{1/2}$	Qstd (m^3/min) **X - axis**	W in. of oil	[ΔW x (Pa/760) x (298/Ta)]$^{1/2}$ **Y-axis**
1	9.0	3.09	1.57	6.6	2.65
2	7.2	2.76	1.41	4.5	2.19
3	5.8	2.48	1.26	3.5	1.93
4	4.4	2.16	1.10	2.5	1.63
5	3.5	1.93	0.98	1.7	1.34

By Linear Regression of Y on X

Slope , mw = 2.1348 **Intercept, bw =** -0.7504

Correlation Coefficient* = 0.9959

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 1.21 m^3/min (43 CFM)

From the Regression Equation, the "Y" value according to

m x Qstd + b = [W x (Pa/760) x (298/Ta)]$^{1/2}$

Therefore, Set Point W = (m x Qstd + b)^2 x (760 / Pa) x (Ta / 298) = **3.16**

*If Correlation Coefficient < 0.990, check and recalibrate again.

Remarks:

QC Reviewer: HY Suen Signature: HY Date: 21-2-14

AECOM Asia Company Limited

TSP - Total Suspended Particulates Sampler
Field Calibration Report

Station: Sau Ming Primary School (ID4)
Date: 13-Feb-14
Pump No.: 1275
Equipment No.: A-001-28T

Operator: Shum Kam Yuen
Next Due Date: 13-May-14
Verified Against: O.T.S. -- 0988
Expiration Date: 20-May-14

Ambient Condition					
Temperature, Ta	281.7	Kelvin	Pressure, Pa	766.0	mmHg

Orifice Transfer Standard Information					
Equipment No.:	988	Slope, mc	1.94727	Intercept, bc	0.02332
Last Calibration Date:	20-May-13	**mc x Qstd + bc = [H x (Pa/760) x (298/Ta)]$^{1/2}$**			
Next Calibration Date:	20-May-14				

Calibration of TSP Sampler

Calibration Point	H in. of water	[H x (Pa/760) x (298/Ta)]$^{1/2}$	Qstd (m^3/min) **X - axis**	W in. of oil	[ΔW x (Pa/760) x (298/Ta)]$^{1/2}$ **Y-axis**
1	9.0	3.10	1.58	6.2	2.57
2	7.5	2.83	1.44	5.0	2.31
3	6.0	2.53	1.29	3.6	1.96
4	4.5	2.19	1.11	2.9	1.76
5	3.4	1.90	0.96	1.9	1.42

By Linear Regression of Y on X

Slope , mw = 1.8090 **Intercept, bw =** -0.3043

Correlation Coefficient* = 0.9948

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 1.21 m^3/min (43 CFM)

From the Regression Equation, the "Y" value according to

m x Qstd + b = [W x (Pa/760) x (298/Ta)]$^{1/2}$

Therefore, Set Point W = (m x Qstd + b)^2 x (760 / Pa) x (Ta / 298) = **3.33**

*If Correlation Coefficient < 0.990, check and recalibrate again.

Remarks:

QC Reviewer: HY Siu Signature: HY Date: 21-2-14

AECOM Asia Company Limited

TSP - Total Suspended Particulates Sampler
Field Calibration Report

Station: Sau Mau Ping Catholic Primary School (ID5)
Operator: Shum Kam Yuen
Date: 13-Feb-14
Next Due Date: 13-May-14
Pump No.: 10088
Verified Against: O.T.S. -- 0988
Equipment No.: A-001-13T
Expiration Date: 20-May-14

Ambient Condition					
Temperature, Ta	281.7	Kelvin	Pressure, Pa	766.0	mmHg

Orifice Transfer Standard Information					
Equipment No.:	988	Slope, mc	1.94727	Intercept, bc	0.02332
Last Calibration Date:	20-May-13	**mc x Qstd + bc = [H x (Pa/760) x (298/Ta)]$^{1/2}$**			
Next Calibration Date:	20-May-14				

Calibration of TSP Sampler

Calibration Point	H in. of water	[H x (Pa/760) x (298/Ta)]$^{1/2}$	Qstd (m^3/min) **X - axis**	W in. of oil	[ΔW x (Pa/760) x (298/Ta)]$^{1/2}$ **Y-axis**
1	8.6	3.03	1.54	6.0	2.53
2	7.4	2.81	1.43	4.8	2.26
3	5.3	2.38	1.21	3.4	1.90
4	4.2	2.12	1.08	2.6	1.66
5	2.9	1.76	0.89	1.6	1.31

By Linear Regression of Y on X

Slope , mw = **1.8350** **Intercept, bw =** **-0.3251**

Correlation Coefficient* = **0.9987**

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 1.21 m^3/min (43 CFM)

From the Regression Equation, the "Y" value according to

m x Qstd + b = [W x (Pa/760) x (298/Ta)]$^{1/2}$

Therefore, Set Point W = (m x Qstd + b)^2 x (760 / Pa) x (Ta / 298) = **3.37**

*If Correlation Coefficient < 0.990, check and recalibrate again.

Remarks:

QC Reviewer: HY Siem Signature: HY Date: 21-2-14

TISCH ENVIROMENTAL, INC.
145 SOUTH MIAMI AVE.
VILLAGE OF CLEVES, OH 45002
513.467.9000
877.263.7610 TOLL FREE
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WWW.TISCH-ENV.COM

AIR POLLUTION MONITORING EQUIPMENT

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - May 20, 2013 Rootsmeter S/N 0438320 Ta (K) - 297
Operator Tisch Orifice I.D. - 0988 Pa (mm) - 751.84

PLATE OR Run #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER DIFF Hg (mm)	ORFICE DIFF H2O (in.)
1	NA	NA	1.00	1.3900	3.2	2.00
2	NA	NA	1.00	0.9720	6.4	4.00
3	NA	NA	1.00	0.8670	7.9	5.00
4	NA	NA	1.00	0.8270	8.7	5.50
5	NA	NA	1.00	0.6800	12.6	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)		Va	(x axis) Qa	(y axis)
0.9884	0.7110	1.4090		0.9957	0.7163	0.8889
0.9842	1.0125	1.9926		0.9915	1.0201	1.2570
0.9821	1.1327	2.2278		0.9894	1.1412	1.4054
0.9811	1.1863	2.3365		0.9884	1.1952	1.4740
0.9759	1.4352	2.8179		0.9832	1.4459	1.7777
Qstd slope (m) =		1.94727		Qa slope (m) =		1.21935
intercept (b) =		0.02332		intercept (b) =		0.01471
coefficient (r) =		0.99998		coefficient (r) =		0.99998
y axis = SQRT[H2O(Pa/760)(298/Ta)]				y axis = SQRT[H2O(Ta/Pa)]		

CALCULATIONS

Vstd = Diff. Vol[(Pa-Diff. Hg)/760](298/Ta)
Qstd = Vstd/Time

Va = Diff Vol [(Pa-Diff Hg)/Pa]
Qa = Va/Time

For subsequent flow rate calculations:

Qstd = 1/m{[SQRT(H2O(Pa/760)(298/Ta))]- b}
Qa = 1/m{[SQRT H2O(Ta/Pa)]- b}

EQUIPMENT CALIBRATION RECORD

Type:	***Laser Dust Monitor***
Manufacturer/Brand:	***SIBATA***
Model No.:	***LD-3***
Equipment No.:	***A.005.07a***
Sensitivity Adjustment Scale Setting:	***557 CPM***
Operator:	*Mike Shek (MSKM)*

Standard Equipment

Equipment:	*Rupprecht & Patashnick TEOM®*		
Venue:	*Cyberport (Pui Ying Secondary School)*		
Model No.:	*Series 1400AB*		
Serial No:	Control: *140AB219899803*		
	Sensor: *1200C143659803*	K_o: *12500*	
Last Calibration Date*:	*18 May 2013*		

*Remarks: Recommended interval for hardware calibration is 1 year

Calibration Result

Sensitivity Adjustment Scale Setting (Before Calibration): *557* CPM
Sensitivity Adjustment Scale Setting (After Calibration): *557* CPM

Hour	Date (dd-mm-yy)	Time	Ambient Condition		Concentration[1] (mg/m^3) **Y-axis**	Total Count[2]	Count/ Minute[3] **X-axis**
			Temp (°C)	R.H. (%)			
1	*18-05-13*	*12:30 - 13:30*	*28.1*	*78*	*0.04714*	*1887*	*31.45*
2	*18-05-13*	*13:30 - 14:30*	*28.1*	*78*	*0.04932*	*1970*	*32.83*
3	*18-05-13*	*14:30 - 15:30*	*28.2*	*77*	*0.05156*	*2056*	*34.27*
4	*18-05-13*	*15:30 - 16:30*	*28.1*	*78*	*0.05083*	*2026*	*33.77*

Note: 1. Monitoring data was measured by Rupprecht & Patashnick TEOM®
2. Total Count was logged by Laser Dust Monitor
3. Count/minute was calculated by (Total Count/60)

By Linear Regression of Y or X
Slope (K-factor): *0.0015*
Correlation coefficient: *0.9978*

Validity of Calibration Record: *17 May 2014*

Remarks:

QC Reviewer: *YW Fung* Signature: Date: 20 May 2013

EQUIPMENT CALIBRATION RECORD

Type:	***Laser Dust Monitor***
Manufacturer/Brand:	***SIBATA***
Model No.:	***LD-3***
Equipment No.:	***A.005.08a***
Sensitivity Adjustment Scale Setting:	***702 CPM***
Operator:	*Mike Shek (MSKM)*

Standard Equipment

Equipment:	*Rupprecht & Patashnick TEOM®*		
Venue:	*Cyberport (Pui Ying Secondary School)*		
Model No.:	*Series 1400AB*		
Serial No:	Control: *140AB219899803*		
	Sensor: *1200C143659803*	K_o:	*12500*
Last Calibration Date*:	*18 May 2013*		

*Remarks: Recommended interval for hardware calibration is 1 year

Calibration Result

Sensitivity Adjustment Scale Setting (Before Calibration): *702* CPM
Sensitivity Adjustment Scale Setting (After Calibration): *702* CPM

Hour	Date (dd-mm-yy)	Time	Ambient Condition		Concentration[1] (mg/m^3) **Y-axis**	Total Count[2]	Count/ Minute[3] **X-axis**
			Temp (°C)	R.H. (%)			
1	*18-05-13*	*12:30 - 13:30*	*28.1*	*78*	*0.04714*	*1764*	*29.40*
2	*18-05-13*	*13:30 - 14:30*	*28.1*	*78*	*0.04932*	*1846*	*30.77*
3	*18-05-13*	*14:30 - 15:30*	*28.2*	*77*	*0.05156*	*1935*	*32.25*
4	*18-05-13*	*15:30 - 16:30*	*28.1*	*78*	*0.05083*	*1899*	*31.65*

Note: 1. Monitoring data was measured by Rupprecht & Patashnick TEOM®
2. Total Count was logged by Laser Dust Monitor
3. Count/minute was calculated by (Total Count/60)

By Linear Regression of Y or X
Slope (K-factor): *0.0016*
Correlation coefficient: *0.9976*

Validity of Calibration Record: *17 May 2014*

Remarks:

QC Reviewer: *YW Fung* Signature: Date: 20 May 2013

EQUIPMENT CALIBRATION RECORD

Type:	***Laser Dust Monitor***
Manufacturer/Brand:	***SIBATA***
Model No.:	***LD-3***
Equipment No.:	***A.005.09a***
Sensitivity Adjustment Scale Setting:	***797 CPM***
Operator:	*Mike Shek (MSKM)*

Standard Equipment

Equipment:	*Rupprecht & Patashnick TEOM®*		
Venue:	*Cyberport (Pui Ying Secondary School)*		
Model No.:	*Series 1400AB*		
Serial No:	Control: *140AB219899803*		
	Sensor: *1200C143659803*	K_o:	*12500*
Last Calibration Date*:	*18 May 2013*		

*Remarks: Recommended interval for hardware calibration is 1 year

Calibration Result

Sensitivity Adjustment Scale Setting (Before Calibration): *797* CPM
Sensitivity Adjustment Scale Setting (After Calibration): *797* CPM

Hour	Date (dd-mm-yy)	Time	Ambient Condition		Concentration[1] (mg/m^3) **Y-axis**	Total Count[2]	Count/ Minute[3] **X-axis**
			Temp (°C)	R.H. (%)			
1	*18-05-13*	*12:30 - 13:30*	*28.1*	*78*	*0.04714*	*1885*	*31.42*
2	*18-05-13*	*13:30 - 14:30*	*28.1*	*78*	*0.04932*	*1965*	*32.75*
3	*18-05-13*	*14:30 - 15:30*	*28.2*	*77*	*0.05156*	*2059*	*34.32*
4	*18-05-13*	*15:30 - 16:30*	*28.1*	*78*	*0.05083*	*2024*	*33.73*

Note: 1. Monitoring data was measured by Rupprecht & Patashnick TEOM®
2. Total Count was logged by Laser Dust Monitor
3. Count/minute was calculated by (Total Count/60)

By Linear Regression of Y or X
Slope (K-factor): *0.0015*
Correlation coefficient: *0.9973*

Validity of Calibration Record: *17 May 2014*

Remarks:

QC Reviewer: *YW Fung* Signature: Date: 20 May 2013

EQUIPMENT CALIBRATION RECORD

Type:	***Laser Dust Monitor***
Manufacturer/Brand:	***SIBATA***
Model No.:	***LD-3***
Equipment No.:	***A.005.10a***
Sensitivity Adjustment Scale Setting:	***753 CPM***
Operator:	*Mike Shek (MSKM)*

Standard Equipment

Equipment:	*Rupprecht & Patashnick TEOM®*		
Venue:	*Cyberport (Pui Ying Secondary School)*		
Model No.:	*Series 1400AB*		
Serial No:	Control: *140AB219899803*		
	Sensor: *1200C143659803*	K_o:	*12500*
Last Calibration Date*:	*18 May 2013*		

*Remarks: Recommended interval for hardware calibration is 1 year

Calibration Result

Sensitivity Adjustment Scale Setting (Before Calibration): *753* CPM
Sensitivity Adjustment Scale Setting (After Calibration): *753* CPM

Hour	Date (dd-mm-yy)	Time	Ambient Condition		Concentration[1] (mg/m^3) **Y-axis**	Total Count[2]	Count/ Minute[3] **X-axis**
			Temp (°C)	R.H. (%)			
1	*18-05-13*	*12:30 - 13:30*	*28.1*	*78*	*0.04714*	*1886*	*31.43*
2	*18-05-13*	*13:30 - 14:30*	*28.1*	*78*	*0.04932*	*1968*	*32.80*
3	*18-05-13*	*14:30 - 15:30*	*28.2*	*77*	*0.05156*	*2061*	*34.35*
4	*18-05-13*	*15:30 - 16:30*	*28.1*	*78*	*0.05083*	*2026*	*33.77*

Note: 1. Monitoring data was measured by Rupprecht & Patashnick TEOM®
2. Total Count was logged by Laser Dust Monitor
3. Count/minute was calculated by (Total Count/60)

By Linear Regression of Y or X
Slope (K-factor): *0.0015*
Correlation coefficient: *0.9983*

Validity of Calibration Record: *17 May 2014*

Remarks:

QC Reviewer: *YW Fung* Signature: Date: 20 May 2013

EQUIPMENT CALIBRATION RECORD

Type:	***Laser Dust Monitor***
Manufacturer/Brand:	***SIBATA***
Model No.:	***LD-3***
Equipment No.:	***A.005.11a***
Sensitivity Adjustment Scale Setting:	***799 CPM***
Operator:	*Mike Shek (MSKM)*

Standard Equipment

Equipment:	*Rupprecht & Patashnick TEOM®*		
Venue:	*Cyberport (Pui Ying Secondary School)*		
Model No.:	*Series 1400AB*		
Serial No:	Control: *140AB219899803*		
	Sensor: *1200C143659803*	K_o: *12500*	
Last Calibration Date*:	*18 May 2013*		

*Remarks: Recommended interval for hardware calibration is 1 year

Calibration Result

Sensitivity Adjustment Scale Setting (Before Calibration): *799* CPM
Sensitivity Adjustment Scale Setting (After Calibration): *799* CPM

Hour	Date (dd-mm-yy)	Time	Ambient Condition		Concentration[1] (mg/m^3) **Y-axis**	Total Count[2]	Count/ Minute[3] **X-axis**
			Temp (°C)	R.H. (%)			
1	*18-05-13*	*12:15 - 13:15*	*28.1*	*78*	*0.04685*	*1871*	*31.18*
2	*18-05-13*	*13:15 - 14:15*	*28.1*	*78*	*0.04941*	*1979*	*32.98*
3	*18-05-13*	*14:15 - 15:15*	*28.2*	*77*	*0.05127*	*2055*	*34.25*
4	*18-05-13*	*15:15 - 16:15*	*28.1*	*78*	*0.05060*	*2021*	*33.68*

Note: 1. Monitoring data was measured by Rupprecht & Patashnick TEOM®
2. Total Count was logged by Laser Dust Monitor
3. Count/minute was calculated by (Total Count/60)

By Linear Regression of Y or X
Slope (K-factor): *0.0015*
Correlation coefficient: *0.9976*

Validity of Calibration Record: *17 May 2014*

Remarks:

QC Reviewer: *YW Fung* Signature: Date: 20 May 2013

EQUIPMENT CALIBRATION RECORD

Type:	***Laser Dust Monitor***
Manufacturer/Brand:	***SIBATA***
Model No.:	***LD-3B***
Equipment No.:	***A.005.13a***
Sensitivity Adjustment Scale Setting:	***643 CPM***
Operator:	*Mike Shek (MSKM)*

Standard Equipment

Equipment:	*Rupprecht & Patashnick TEOM®*		
Venue:	*Cyberport (Pui Ying Secondary School)*		
Model No.:	*Series 1400AB*		
Serial No:	Control: *140AB219899803*		
	Sensor: *1200C143659803*	K_o: *12500*	
Last Calibration Date*:	*18 May 2013*		

*Remarks: Recommended interval for hardware calibration is 1 year

Calibration Result

Sensitivity Adjustment Scale Setting (Before Calibration): *643* CPM
Sensitivity Adjustment Scale Setting (After Calibration): *643* CPM

Hour	Date (dd-mm-yy)	Time	Ambient Condition		Concentration[1] (mg/m^3) **Y-axis**	Total Count[2]	Count/ Minute[3] **X-axis**
			Temp (°C)	R.H. (%)			
1	*18-05-13*	*12:15 - 13:15*	*28.1*	*78*	*0.04685*	*1867*	*31.12*
2	*18-05-13*	*13:15 - 14:15*	*28.1*	*78*	*0.04941*	*1975*	*32.92*
3	*18-05-13*	*14:15 - 15:15*	*28.2*	*77*	*0.05127*	*2048*	*34.13*
4	*18-05-13*	*15:15 - 16:15*	*28.1*	*78*	*0.05060*	*2017*	*33.62*

Note: 1. Monitoring data was measured by Rupprecht & Patashnick TEOM®
2. Total Count was logged by Laser Dust Monitor
3. Count/minute was calculated by (Total Count/60)

By Linear Regression of Y or X
Slope (K-factor): *0.0015*
Correlation coefficient: *0.9986*

Validity of Calibration Record: *17 May 2014*

Remarks:

QC Reviewer: *YW Fung* Signature: Date: 20 May 2013

EQUIPMENT CALIBRATION RECORD

Type:	***Laser Dust Monitor***
Manufacturer/Brand:	***SIBATA***
Model No.:	***LD-3B***
Equipment No.:	***A.005.14a***
Sensitivity Adjustment Scale Setting:	***786 CPM***
Operator:	*Mike Shek (MSKM)*

Standard Equipment

Equipment:	*Rupprecht & Patashnick TEOM®*		
Venue:	*Cyberport (Pui Ying Secondary School)*		
Model No.:	*Series 1400AB*		
Serial No:	Control: *140AB219899803*		
	Sensor: *1200C143659803*	K_o: *12500*	
Last Calibration Date*:	*18 May 2013*		

*Remarks: Recommended interval for hardware calibration is 1 year

Calibration Result

Sensitivity Adjustment Scale Setting (Before Calibration): *786* CPM
Sensitivity Adjustment Scale Setting (After Calibration): *786* CPM

Hour	Date (dd-mm-yy)	Time	Ambient Condition		Concentration[1] (mg/m^3) **Y-axis**	Total Count[2]	Count/ Minute[3] **X-axis**
			Temp (°C)	R.H. (%)			
1	*18-05-13*	*12:15 - 13:15*	*28.1*	*78*	*0.04685*	*2005*	*33.42*
2	*18-05-13*	*13:15 - 14:15*	*28.1*	*78*	*0.04941*	*2121*	*35.35*
3	*18-05-13*	*14:15 - 15:15*	*28.2*	*77*	*0.05127*	*2194*	*36.57*
4	*18-05-13*	*15:15 - 16:15*	*28.1*	*78*	*0.05060*	*2167*	*36.12*

Note: 1. Monitoring data was measured by Rupprecht & Patashnick TEOM®
2. Total Count was logged by Laser Dust Monitor
3. Count/minute was calculated by (Total Count/60)

By Linear Regression of Y or X
Slope (K-factor): *0.0014*
Correlation coefficient: *0.9987*

Validity of Calibration Record: *17 May 2014*

Remarks:

QC Reviewer: *YW Fung* Signature: Date: 20 May 2013

EQUIPMENT CALIBRATION RECORD

Type:	***Laser Dust Monitor***
Manufacturer/Brand:	***SIBATA***
Model No.:	***LD-3B***
Equipment No.:	***A.005.16a***
Sensitivity Adjustment Scale Setting:	***521 CPM***
Operator:	*Mike Shek (MSKM)*

Standard Equipment

Equipment:	*Rupprecht & Patashnick TEOM®*		
Venue:	*Cyberport (Pui Ying Secondary School)*		
Model No.:	*Series 1400AB*		
Serial No:	Control: *140AB219899803*		
	Sensor: *1200C143659803*	K_o: *12500*	
Last Calibration Date*:	*18 May 2013*		

*Remarks: Recommended interval for hardware calibration is 1 year

Calibration Result

Sensitivity Adjustment Scale Setting (Before Calibration): *521* CPM
Sensitivity Adjustment Scale Setting (After Calibration): *521* CPM

Hour	Date (dd-mm-yy)	Time	Ambient Condition		Concentration[1] (mg/m^3) **Y-axis**	Total Count[2]	Count/ Minute[3] **X-axis**
			Temp (°C)	R.H. (%)			
1	*27-07-13*	*11:00 - 12:00*	*27.3*	*75*	*0.04734*	*1893*	*31.55*
2	*27-07-13*	*12:00 - 13:00*	*27.3*	*75*	*0.04789*	*1915*	*31.92*
3	*27-07-13*	*13:00 - 14:00*	*27.4*	*74*	*0.04953*	*1976*	*32.93*
4	*27-07-13*	*14:00 - 15:00*	*27.4*	*75*	*0.04867*	*1949*	*32.48*

Note: 1. Monitoring data was measured by Rupprecht & Patashnick TEOM®
2. Total Count was logged by Laser Dust Monitor
3. Count/minute was calculated by (Total Count/60)

By Linear Regression of Y or X
Slope (K-factor): *0.0015*
Correlation coefficient: *0.9934*

Validity of Calibration Record: *26 July 2014*

Remarks:

QC Reviewer: *YW Fung* Signature: _____ Date: 29 July 2013

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
G/F., 9/F., 12/F., 13/F. & 20/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.
香港黃竹坑道37號利達中心地下，9樓，12樓，13樓及20樓
E-mail: smec@cigismec.com Website: www.cigismec.com
Tel : (852) 2873 6860
Fax : (852) 2555 7533
HOKLAS 028

CERTIFICATE OF CALIBRATION

Certificate No.: 13CA1107 01-01

Item tested

Description:	Sound Level Meter (Type 1)	,	Microphone
Manufacturer:	Rion Co., Ltd.	,	Rion Co., Ltd.
Type/Model No.:	NL-31	,	UC-53A
Serial/Equipment No.:	00320528 / N.007.03A	,	90565
Adaptors used:	-	,	-

Item submitted by

Customer Name:	AECOM ASIA CO., LTD.
Address of Customer:	-
Request No.:	-
Date of receipt:	07-Nov-2013

Date of test: 08-Nov-2013

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	22-Jun-2014	CIGISMEC
Signal generator	DS 360	33873	15-Apr-2014	CEPREI
Signal generator	DS 360	61227	15-Apr-2014	CEPREI

Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	60 ± 10 %
Air pressure:	1000 ± 10 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Huang Jian Min/Feng Jun Qi **Date:** 11-Nov-2013 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
G/F., 9/F., 12/F., 13/F. & 20/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong. Tel : (852) 2873 6860
香港黃竹坑道37號利達中心地下，9樓，12樓，13樓及20樓 Fax : (852) 2555 7533
E-mail: smec@cigismec.com Website: www.cigismec.com

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CERTIFICATE OF CALIBRATION

Certificate No.: 13CA0305 01-01 **Page** 1 **of** 2

Item tested

Description:	Sound Level Meter (Type 1)	,	Microphone
Manufacturer:	B & K	,	B & K
Type/Model No.:	2250-L	,	4950
Serial/Equipment No.:	2681366 (N.011.01)	,	2665582
Adaptors used:	-	,	-

Item submitted by

Customer Name:	AECOM ASIA CO LIMITED
Address of Customer:	-
Request No.:	-
Date of receipt:	05-Mar-2013

Date of test: 05-Mar-2013

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	23-May-2013	CIGISMEC
Signal generator	DS 360	33873	29-May-2013	CEPREI
Signal generator	DS 360	61227	29-May-2013	CEPREI

Ambient conditions

Temperature:	21 ± 1 °C
Relative humidity:	60 ± 10 %
Air pressure:	1000 ± 10 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Huang Jian Min/Feng Jun Qi **Date:** 05-Mar-2013 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
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Tel : (852) 2873 6860
Fax : (852) 2555 7533
HOKLAS 028

CERTIFICATE OF CALIBRATION

Certificate No.: 13CA1107 01-02 **Page:** 1 **of** 2

Item tested

Description:	Acoustical Calibrator (Class 1)
Manufacturer:	Rion Co., Ltd.
Type/Model No.:	NC-73
Serial/Equipment No.:	10307223 / N.004.08
Adaptors used:	-

Item submitted by

Curstomer:	AECOM ASIA CO., LTD.
Address of Customer:	-
Request No.:	-
Date of receipt:	07-Nov-2013

Date of test: 08-Nov-2013

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2341427	17-Apr-2014	SCL
Preamplifier	B&K 2673	2239857	16-Apr-2014	CEPREI
Measuring amplifier	B&K 2610	2346941	24-Apr-2014	CEPREI
Signal generator	DS 360	61227	15-Apr-2014	CEPREI
Digital multi-meter	34401A	US36087050	10-Dec-2013	CEPREI
Audio analyzer	8903B	GB41300350	15-Apr-2014	CEPREI
Universal counter	53132A	MY40003662	15-Apr-2014	CEPREI

Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	60 ± 10 %
Air pressure:	1000 ± 10 hPa

Test specifications

1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.

2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.

3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on **page 2** of this certificate.

Approved Signatory: Huang Jian Min/Feng Jun Qi **Date:** 11-Nov-2013 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.