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ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Mar 20, 2017 Rootsmeter S/N 0438320 Ta (K) - 293
 Operator Tisch Orifice I.D. - 0005 Pa (mm) - 759.46

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	1.3960	3.2	2.00
2	NA	NA	1.00	0.9970	6.4	4.00
3	NA	NA	1.00	0.8910	7.8	5.00
4	NA	NA	1.00	0.8500	8.7	5.50
5	NA	NA	1.00	0.6990	12.7	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	Va	(x axis) Qa	(y axis)
1.0120	0.7249	1.4257	0.9958	0.7133	0.8784
1.0078	1.0108	2.0163	0.9916	0.9946	1.2423
1.0058	1.1288	2.2543	0.9896	1.1107	1.3889
1.0047	1.1820	2.3643	0.9885	1.1630	1.4567
0.9993	1.4296	2.8514	0.9832	1.4066	1.7568
Qstd slope (m) = 2.02533			Qa slope (m) = 1.26823		
intercept (b) = -0.03593			intercept (b) = -0.02214		
coefficient (r) = 0.99983			coefficient (r) = 0.99983		
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 }



Certificate of Calibration

Calibration Certification Information

Cal. Date: January 24, 2018	Rootsmeter S/N: 438320	Ta: 293	°K
Operator: Jim Tisch		Pa: 756.9	mm Hg
Calibration Model #: TE-5025A	Calibrator S/N: 3166		

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	1.0270	6.4	4.00
3	5	6	1	0.9220	7.9	5.00
4	7	8	1	0.8780	8.7	5.50
5	9	10	1	0.7270	12.6	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)
1.0087	0.6990	1.4233	0.9958	0.6901	0.8799
1.0044	0.9780	2.0129	0.9915	0.9655	1.2443
1.0024	1.0872	2.2505	0.9896	1.0733	1.3912
1.0013	1.1404	2.3603	0.9885	1.1259	1.4591
0.9961	1.3701	2.8467	0.9834	1.3526	1.7598
QSTD	m=	2.12231	QA	m=	1.32895
	b=	-0.06016		b=	-0.03719
	r=	0.99999		r=	0.99999

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 = $Vstd / \Delta Time$	Qa = $Va / \Delta Time$
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



Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA1b
 Equipment no. : HVS001

Calibration Date : 08-Mar-18
 Calibration Due Date : 08-May-18

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	288	Kelvin	Pressure, P _a
			1019 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori001	Slope, m _c	2.02533	Intercept, b _c	-0.03593
Last Calibration Date	20-Mar-17	$\left(H \times P_a / 1013.3 \times 298 / T_a \right)^{1/2}$ $m_c \times Q_{std} + b_c$			
Next Calibration Date	20-Mar-18				

Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	1.6	1.6	3.2	0.9187	28	28.5620
2	2.5	2.5	5.0	1.1439	36	36.7225
3	3.8	3.8	7.6	1.4062	44	44.8831
4	5.0	5.0	10.0	1.6104	52	53.0436
5	6.2	6.2	12.4	1.7913	60	61.2042

By Linear Regression of Y on X

Slope, m = 36.7366 Intercept, b = -5.5976
 Correlation Coefficient* = 0.9978
 Calibration Accepted = Yes/No**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : As per client's provided information, the equipment reference no. of the calibrated High Volume Sampler has been re-assigned from EL452 to HVS001 with respect to the update in quality management system.

Calibrated by : Jackey MA
 Date : 08-Mar-18

Checked by : Pauline Wong
 Date : 08-Mar-18



Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA2a
 Equipment no. : HVS002

Calibration Date : 08-Mar-18
 Calibration Due Date : 08-May-18

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	288	Kelvin	Pressure, P _a
			1019 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori001	Slope, m _c	2.02533	Intercept, b _c	-0.03593
Last Calibration Date	20-Mar-17	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $m_c \times Q_{std} + b_c$			
Next Calibration Date	20-Mar-18				

Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	1.6	1.6	3.2	0.9187	30	30.6021
2	2.5	2.5	5.0	1.1439	38	38.7627
3	3.9	3.9	7.8	1.4244	50	51.0035
4	5.2	5.2	10.4	1.6420	55	56.1038
5	6.5	6.5	13.0	1.8337	62	63.2443

By Linear Regression of Y on X

Slope, m = 35.6180 Intercept, b = -1.6563
 Correlation Coefficient* = 0.9966
 Calibration Accepted = Yes/No**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : As per client's provided information, the equipment reference no. of the calibrated High Volume Sampler has been re-assigned from EL449 to HVS002 with respect to the update in quality management system.

Calibrated by : Jackey MA
 Date : 08-Mar-18

Checked by : Pualine Wong
 Date : 08-Mar-18



Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA3a
 Equipment no. : HVS012

Calibration Date : 09-Mar-18
 Calibration Due Date : 09-May-18

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition						
Temperature, T _a	288		Kelvin	Pressure, P _a	1023 mmHg	
Orifice Transfer Standard Information						
Equipment No.	Ori001		Slope, m _c	2.02533	Intercept, b _c	-0.03593
Last Calibration Date	20-Mar-17		$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $m_c \times Q_{std} + b_c$			
Next Calibration Date	20-Mar-18					
Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	1.5	1.5	3.0	0.8918	34	34.7504
2	2.4	2.4	4.8	1.1234	40	40.8828
3	3.7	3.7	7.4	1.3905	48	49.0594
4	4.8	4.8	9.6	1.5813	54	55.1918
5	6.0	6.0	12.0	1.7659	59	60.3021
By Linear Regression of Y on X						
Slope, m		=	29.6409	Intercept, b		= 8.0050
Correlation Coefficient*		=	0.9995			
Calibration Accepted		=	Yes/No**			

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : As per client's provided information, the equipment reference no. of the calibrated High Volume Sampler has been re-assigned from EL333 to HVS012 with respect to the update in quality management system.

Calibrated by : Jackey MA
 Date : 09-Mar-18

Checked by : Pauline Wong
 Date : 09-Mar-18



Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA4a
 Equipment no. : HVS004

Calibration Date : 09-Mar-18
 Calibration Due Date : 09-May-18

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	288	Kelvin	Pressure, P _a
			1023 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori001	Slope, m _c	2.02533	Intercept, b _c	-0.03593
Last Calibration Date	20-Mar-17	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $m_c \times Q_{std} + b_c$			
Next Calibration Date	20-Mar-18				

Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.)	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31)
	H (inches of water)					
	(up)	(down)	(difference)			
1	1.5	1.5	3.0	0.8918	28	28.6180
2	2.5	2.5	5.0	1.1462	38	38.8387
3	3.8	3.8	7.6	1.4089	48	49.0594
4	4.9	4.9	9.8	1.5975	54	55.1918
5	6.2	6.2	12.4	1.7948	62	63.3683

By Linear Regression of Y on X

Slope, m = 38.0787 Intercept, b = -5.0704
 Correlation Coefficient* = 0.9995
 Calibration Accepted = Yes/No**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : As per client's provided information, the equipment reference no. of the calibrated High Volume Sampler has been
 re-assigned from EL390 to HVS004 with respect to the update in quality management system.

Calibrated by : Jackey MA

Checked by : Pauline Wong

Date : 09-Mar-18

Date : 09-Mar-18



Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA5b
 Equipment no. : HVS010

Calibration Date : 09-Mar-18
 Calibration Due Date : 09-May-18

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	288	Kelvin	Pressure, P _a
			1023 mmHg

Orifice Transfer Standard Information				
Equipment No.	Ori001	Slope, m _c	2.02533	Intercept, b _c
				-0.03593
Last Calibration Date	20-Mar-17	$\left(H \times P_a / 1013.3 \times 298 / T_a \right)^{1/2}$ $= m_c \times Q_{std} + b_c$		
Next Calibration Date	20-Mar-18			

Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	H (inches of water)	(up)	(down)			
1	1.5	1.5	3.0	0.8918	32	32.7062
2	2.5	2.5	5.0	1.1462	40	40.8828
3	3.9	3.9	7.8	1.4271	48	49.0594
4	5.1	5.1	10.2	1.6294	54	55.1918
5	5.9	5.9	11.8	1.7512	59	60.3021

By Linear Regression of Y on X

Slope, m = 31.3759 Intercept, b = 4.6699
 Correlation Coefficient* = 0.9989
 Calibration Accepted = Yes/No**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : As per client's provided information, the equipment reference no. of the calibrated High Volume Sampler has been re-assigned from EL222 to HVS010 with respect to the update in quality management system.

Calibrated by : Jackey MA
 Date : 09-Mar-18

Checked by : Pauline Wong
 Date : 09-Mar-18



Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA6a
 Equipment no. : HVS013

Calibration Date : 9-Mar-18
 Calibration Due Date : 9-May-18

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T_a	288	Kelvin	Pressure, P_a
			1023 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori001	Slope, m_c	2.02533	Intercept, b_c	-0.03593
Last Calibration Date	20-Mar-17	$\left(H \times P_a / 1013.3 \times 298 / T_a \right)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	20-Mar-18				

Calibration of TSP						
Calibration Point	Manometer Reading			Q_{std} ($m^3 / min.$) X-axis	Continuous Flow Recorder, W (CFM)	IC $(W(P_a/1013.3 \times 298/T_a)^{1/2}/35.31)$ Y-axis
	(up)	(down)	(difference)			
1	1.6	1.6	3.2	0.9205	35	35.7725
2	2.5	2.5	5.0	1.1462	42	42.9269
3	3.9	3.9	7.8	1.4271	48	49.0594
4	5.1	5.1	10.2	1.6294	54	55.1918
5	6.6	6.6	13.2	1.8512	60	61.3242

By Linear Regression of Y on X

Slope, m = 26.9656 Intercept, b = 11.2411

Correlation Coefficient* = 0.9986

Calibration Accepted = Yes/No**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : As per client's provided information, the equipment reference no. of the calibrated High Volume Sampler has been re-assigned from EL551 to HVS013 with respect to the update in quality management system.

Calibrated by : Jackey MA
 Date : 9-Mar-18

Checked by : Pauline Wong
 Date : 9-Mar-18



CERTIFICATE OF CALIBRATION

Certificate No.: 17CA0426 01-02 Page 1 of 2

Item tested

Description:	Sound Level Meter (Type 1)	Microphone
Manufacturer:	Larson Davis	PCB
Type/Model No.:	LxT1	377B02
Serial/Equipment No.:	0003737	171529
Adaptors used:	-	-

Item submitted by

Customer Name: Lam Environmental Service Ltd.
Address of Customer: -
Request No.: -
Date of receipt: 26-Apr-2017

Date of test: 28-Apr-2017

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	18-Jun-2017	CIGISMEC
Signal generator	DS 360	61227	01-Apr-2018	CEPREI

Ambient conditions

Temperature: 21 ± 1 °C
Relative humidity: 50 ± 10 %
Air pressure: 1010 ± 5 hPa

Test specifications

- 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.
- 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%.
- 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 responsiveness 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 Jun Qi / Feng Jun Qi

Date: 04-May-2017

Company Chop:



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.



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 17CA0426 01-02

Page 2 of 2

1, Electrical Tests

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertainty (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	2.1
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range, Step 5 dB at 4 kHz	Pass	0.3	2.2
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
Linearity range for SPL	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
	Single Burst Fast	Pass	0.3	
Peak response	Single Burst Slow	Pass	0.3	
	Single 100µs rectangular pulse	N/A	N/A	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time weighting I	1 ms burst duty factor 1/10 ³ at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10 ⁴ at 4kHz	Pass	0.3	
Time averaging	Single burst 10 ms at 4 kHz	Pass	0.4	
	Single burst 10 ms at 4 kHz	Pass	0.4	
Pulse range	SPL	Pass	0.3	
	Leq	Pass	0.4	
Sound exposure level				
Overload indication				

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by:

Lai Sheng Jie
Date: 28-Apr-2017

Checked by:

Fung Chi Yip
Date: 04-May-2017

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.



CERTIFICATE OF CALIBRATION

Certificate No.: 18CA0322 01 Page 1 of 2

Item tested

Description:	Sound Level Meter (Type 1)	Microphone
Manufacturer:	Larson Davis	PCB
Type/Model No.:	LxT1	377B02
Serial/Equipment No.:	0003737	171529
Adaptors used:	-	-

Item submitted by

Customer Name: Lam Geotechnics Ltd.
Address of Customer: -
Request No.: -
Date of receipt: 22-Mar-2018

Date of test: 28-Mar-2018

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	08-Sep-2018	CIGISMEC
Signal generator	DS 360	61227	01-Apr-2018	CEPREI

Ambient conditions

Temperature: 21 ± 1 °C
Relative humidity: 50 ± 10 %
Air pressure: 1005 ± 5 hPa

Test specifications

- 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.
- 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 $\pm 20\%$.
- 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 responsiveness 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:



Feng Jun Qi

Date: 06-Apr-2018

Company Chop:



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.



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 18CA0322 01 Page 2 of 2

1. Electrical Tests

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertainty (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	2.1
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range, Step 5 dB at 4 kHz	Pass	0.3	2.2
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
Linearity range for SPL	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	N/A	N/A	
	R.M.S. accuracy	Crest factor of 3	Pass	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/10 ³ at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10 ⁴ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2. Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3. Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by:

Date:

Fung Chi Yip
28-Mar-2018

Checked by:

Date:

Lam Tze Wai
06-Apr-2018

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.



CERTIFICATE OF CALIBRATION

Certificate No.: 17CA1110 02

Page: 1 of 2

Item tested

Description: Acoustical Calibrator (Class 1)
Manufacturer: Rion Co., Ltd.
Type/Model No.: NC-73
Serial/Equipment No.: 10707358
Adaptors used: -

Item submitted by

Customer: Lam Geotechnics Ltd.
Address of Customer: -
Request No.: -
Date of receipt: 10-Nov-2017

Date of test: 14-Nov-2017

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2341427	11-Apr-2018	SCL
Preamplifier	B&K 2673	2239857	05-May-2018	CEPREI
Measuring amplifier	B&K 2610	2346941	03-May-2018	CEPREI
Signal generator	DS 360	61227	01-Apr-2018	CEPREI
Digital multi-meter	34401A	US36087050	25-Apr-2018	CEPREI
Audio analyzer	8903B	GB41300350	21-Apr-2018	CEPREI
Universal counter	53132A	MY40003662	22-Apr-2018	CEPREI

Ambient conditions

Temperature: 21 ± 1 °C
Relative humidity: 50 ± 10 %
Air pressure: 1010 ± 5 hPa

Test specifications

- 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.
- The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.
- 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 Jun Min / Feng Jun Qi

Date: 15-Nov-2017

Company Chop:



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.



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 17CA1110 02

Page: 2 of 2

1. Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	(Output level in dB re 20 µPa)
			Estimated Expanded Uncertainty dB
1000	94.00	93.93	0.10

2. Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz **STF = 0.008 dB**

Estimated expanded uncertainty 0.005 dB

3. Actual Output Frequency

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz **Actual Frequency = 991.5 Hz**

Estimated expanded uncertainty 0.1 Hz Coverage factor k = 2.2

4. Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz **TND = 0.3 %**

Estimated expanded uncertainty 0.7 %


The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

Calibrated by:


Li Sheng Jie
Date: 14-Nov-2017

- End -

Checked by:


Fung Chi Yip
Date: 15-Nov-2017

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.



REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

Information supplied by customer:

CONTACT: MR. SAM LAM **WORK ORDER:** HK1810086
CLIENT: LAM GEOTECHNICS LIMITED
DATE RECEIVED: 23/01/2018
DATE OF ISSUE: 25/01/2018
ADDRESS: 11/F, CENTRE POINT, 181-185, GLOUCESTER ROAD,
WANCHAI, HONG KONG
PROJECT: ---

METHOD OF PERFORMANCE CHECK/ CALIBRATION:

Ref: APHA22nd ed 2130B

COMMENTS


It is certified that the item under performance check/calibration has been calibrated/checked by corresponding calibrated equipment in the laboratory.
Maximum Tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of Pilot Testing Limited will be followed.

Scope of Test:	Turbidity
Equipment Type:	Turbidimeter
Brand Name:	Xin Rui
Model No.:	WGZ-3B
Serial No.:	1309192
Equipment No.:	---
Date of Calibration:	24/01/2018

Remarks:

This is the Final Report. Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

Approved Signatory: _____


Ms. Wong Po Yan, Pauline
Assistant Laboratory Manager

Issue Date: _____

25/01/2018

This report may not be reproduced except with prior written approval from Pilot Testing Limited.

Address: No.B12, 5th Floor, Block B, Tonic Industrial Centre, No.19 Lam Hing Street, Kowloon Bay, Kowloon
Phone +852 2527 6691 | Email info@pilot-testing.com

REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

WORK ORDER: HK1810086
DATE OF ISSUE: 25/01/2018
CLIENT: LAM GEOTECHNICS LIMITED

Equipment Type:	Turbidimeter
Brand Name:	Xin Rui
Model No.:	WGZ-3B
Serial No.:	1309192
Equipment No.:	---
Date of Calibration:	24/01/2018
Date of next Calibration:	24/04/2018

Parameters:
Turbidity

Method Ref: APHA 22nd ed. 2130B

Expected Reading (NTU)	Display Reading (NTU)	Tolerance
0	0.00	---
4	4.12	3.0%
10	10.4	4.0%
40	43.0	7.4%
100	107	7.0%
400	416	4.1%
1000	1000	0.0%
	Tolerance Limit (±)	10%

Remark: "Displayed Reading" presents the figures shown on item under calibration/checking regardless of equipment precision or significant figures.



REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

Information supplied by customer:

CONTACT: MR. SAM LAM **WORK ORDER:** HK1810350
CLIENT: LAM GEOTECHNICS LIMITED
DATE RECEIVED: 12/04/2018
DATE OF ISSUE: 17/04/2018
ADDRESS: 11/F, CENTRE POINT, 181-185, GLOUCESTER ROAD,
 WANCHAI, HONG KONG
PROJECT: ---

METHOD OF PERFORMANCE CHECK/ CALIBRATION:

Ref: APHA22nd ed 2130B

COMMENTS

It is certified that the item under performance check/calibration has been calibrated/checked by corresponding calibrated equipment in the laboratory.
 Maximum Tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of Pilot Testing Limited will be followed.

Scope of Test:	Turbidity
Equipment Type:	Turbidimeter
Brand Name:	Xin Rui
Model No.:	WGZ-3B
Serial No.:	1309192
Equipment No.:	---
Date of Calibration:	16/04/2018

Remarks:

This is the Final Report. Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

Approved Signatory: _____

Ms. Wong Po Yan, Pauline
Assistant Laboratory Manager

Issue Date: 17/04/2018

This report may not be reproduced except with prior written approval from Pilot Testing Limited.

**REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION**

WORK ORDER: HK1810350
DATE OF ISSUE: 17/04/2018
CLIENT: LAM GEOTECHNICS LIMITED

Equipment Type:	Turbidimeter
Brand Name:	Xin Rui
Model No.:	WGZ-3B
Serial No.:	1309192
Equipment No.:	---
Date of Calibration:	16/04/2018
Date of next Calibration:	16/07/2018

Parameters:
Turbidity

Method Ref: APHA 22nd ed. 2130B

Expected Reading (NTU)	Display Reading (NTU)	Tolerance
0	0.00	---
4	3.99	-0.2%
10	9.99	-0.1%
40	39.71	-0.7%
100	99.94	-0.1%
400	399.9	0.0%
1000	995.6	-0.4%
	Tolerance Limit (±)	10%

Remark: "Displayed Reading" presents the figures shown on item under calibration/checking regardless of equipment precision or significant figures.

This report may not be reproduced except with prior written approval from Pilot Testing Limited.

**REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION****Information supplied by customer:**

CONTACT: MR. SAM LAM **WORK ORDER:** HK1810206
CLIENT: LAM GEOTECHNICS LIMITED
DATE RECEIVED: 01/03/2018
DATE OF ISSUE: 07/03/2018
ADDRESS: 11/F, CENTRE POINT, 181-185, GLOUCESTER ROAD,
WANCHAI, HONG KONG
PROJECT: ---

METHOD OF PERFORMANCE CHECK/ CALIBRATION:

Ref: APHA22nd ed 2130B

COMMENTS

It is certified that the item under performance check/calibration has been calibrated/checked by corresponding calibrated equipment in the laboratory.

Maximum Tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of Pilot Testing Limited will be followed.

Scope of Test:	Turbidity
Equipment Type:	Turbidimeter
Brand Name:	Xin Rui
Model No.:	WGZ-3B
Serial No.:	T3B.N1711062
Equipment No.:	---
Date of Calibration:	07/03/2018

Remarks:

This is the Final Report. Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

Approved Signatory:

Ms. Wong Po Yan, Pauline
Assistant Laboratory Manager

Issue Date:

07/03/2018

This report may not be reproduced except with prior written approval from Pilot Testing Limited.

**REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION**

WORK ORDER: HK1810206
DATE OF ISSUE: 07/03/2018
CLIENT: LAM GEOTECHNICS LIMITED

Equipment Type:	Turbidimeter
Brand Name:	Xin Rui
Model No.:	WGZ-3B
Serial No.:	T3B.N1711062
Equipment No.:	---
Date of Calibration:	07/03/2018
Date of next Calibration:	04/06/2018

Parameters:
Turbidity

Method Ref: APHA 22nd ed. 2130B

Expected Reading (NTU)	Display Reading (NTU)	Tolerance
0	0.00	---
4	4.00	0.0%
10	10.02	0.2%
40	38.85	-2.9%
100	97.87	-2.1%
400	397.8	-0.5%
1000	1000.0	0.0%
	Tolerance Limit (±)	10%

Remark: "Displayed Reading" presents the figures shown on item under calibration/checking regardless of equipment precision or significant figures.

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**REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION****Information supplied by customer:**

CONTACT: MR. SAM LAM **WORK ORDER:** HK1810091
CLIENT: LAM GEOTECHNICS LIMITED
DATE RECEIVED: 25/01/2018
DATE OF ISSUE: 25/01/2018
ADDRESS: 11/F, CENTRE POINT, 181-185, GLOUCESTER ROAD,
WANCHAI, HONG KONG
PROJECT: ---

METHOD OF PERFORMANCE CHECK/ CALIBRATION:

Ref: APHA22nd ed 2130B

COMMENTS

It is certified that the item under performance check/calibration has been calibrated/checked by corresponding calibrated equipment in the laboratory.

Maximum Tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of Pilot Testing Limited will be followed.

Scope of Test:	Turbidity
Equipment Type:	Turbidity Meter
Brand Name:	PCE Instruments
Model No.:	PCE-TUM 20
Serial No.:	Q942542
Equipment No.:	---
Date of Calibration:	25/01/2018

Remarks:

This is the Final Report. Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

Approved Signatory: _____
Ms. Wong Po Yan, Pauline
Assistant Laboratory Manager

Issue Date: _____ 25/01/2018

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Address: No.B12, 5th Floor, Block B, Tonic Industrial Centre, No.19 Lam Hing Street, Kowloon Bay, Kowloon
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**REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION**

WORK ORDER: HK1810091
DATE OF ISSUE: 25/01/2018
CLIENT: LAM GEOTECHNICS LIMITED

Equipment Type:	Turbidity Meter
Brand Name:	PCE Instruments
Model No.:	PCE-TUM 20
Serial No.:	Q942542
Equipment No.:	---
Date of Calibration:	25/01/2018
Date of next Calibration:	25/04/2018

Parameters:**Turbidity**Method Ref: APHA 22nd ed. 2130B

Expected Reading (NTU)	Display Reading (NTU)	Tolerance
0	0.00	---
4	4.17	4.3%
20	21.8	9.2%
40	42.5	6.2%
100	98.0	-2.0%
400	397	-0.8%
800	870	8.8%
	Tolerance Limit (±)	10%

Remark: "Displayed Reading" presents the figures shown on item under calibration/checking regardless of equipment precision or significant figures.



EQUIPMENT PERFORMANCE CHECK / CALIBRATION REPORT

Report No. : HK1810373
 Project Name : EQUIPMENT PERFORMANCE CHECK/CALIBRATION REPORT
 Date of Issue : 19/04/2018

Customer : LAM ENVIRONMENTAL SERVICES LIMITED
 Address : 11/F., CENTRE POINT, 181-185 GLOUCESTER ROAD, WAN CHAI, HONG KONG

Calibration Job No. : HK1810373
 Test Item No. : HK1810373-01
 Test Item Details
 Test Item Description : Sonde
 Manufacturer : YSI
 Model No. : Professional Plus
 Serial No. : 14E100105
 Performance Method : Checked according to in-house method CAL005
 (References: Temperature (Section 6 of International Accreditation New Zealand Technical Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure), pH value (APHA 21e 4500H:B), Salinity (Refer to Conductivity APHA 19e 2510B) , Dissolved oxygen (APHA 19e 4500-O,C))

Test Item Receipt Date : 18/04/2018
 Test Item Calibration Date : 18/04/2018

- Notes :
1. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.
 2. Results relate to item(s) as received.
 3. \pm indicates the tolerance limit
 4. N/A = Not applicable
 5. APHA - American Public Health Association, American Water Works Association and Water Environment Federation, Standard Methods for the Examination of Water and Wastewater, APHA-AWWA-WEF. USA
 6. DO, pH, salinity and temperature performance check was conducted by Pilot Testing Limited.
 7. Because of high sensitivity and ease of measurement, the conductivity method (according to APHA 19e 2510) is used to determine salinity.

Approved Signatory

:

Ms. Wong Po Yan, Pauline
 (Assistant Laboratory Manager)

Issue Date:

19/04/2018


REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1810373
DATE OF ISSUE: 19/04/2018
CLIENT: LAM ENVIRONMENTAL SERVICES LIMITED

Equipment Type	Sonde
Manufacturer	YSI
Model No.	Professional Plus
Serial No.	14E100105
Date of Calibration	18-Apr-18
Date of next Calibration	18-Jul-18

Parameters:

Temperature (Method Ref: Section 6 of International Accreditation New Zealand Technical Guide No.3 Second edition March 2008: Working Thermometer Calibration Procedure)

Reference Reading (°C)	Display Reading (°C)	Deviation (°C)
7.2	7.2	0.0
14.7	14.6	-0.1
26.0	25.9	-0.1
Tolerance Limit		±2.0

pH Value (Method Ref: APHA21e, 4500H:B)

Expected Reading (pH unit)	Reference Reading (pH unit)	Display Reading (pH unit)	Deviation (pH unit)
4.0	4.12	4.15	0.03
7.0	7.06	7.08	0.02
10.0	10.05	9.92	-0.13
Tolerance Limit			±0.20

Conductivity (Method Ref: APHA 19e, 2510)

KCl concentration (mol/L)	Reference Reading (ms/cm)	Display Reading (ms/cm)	Deviation (%)
0.0000	0.00	0.00	--
0.1000	11.8	11.6	-1.69
0.2000	22.7	22.7	0.00
0.5000	58.6	57.9	-1.19
Tolerance Limit			±2.0

Dissolved Oxygen (DO) (Method Ref: APHA 19e, 4500-O, C)

Reference DO reading (mg/L)	DO reading od DO probe (mg/L)	Deviation (mg/L)
8.44	8.60	0.16
7.37	7.42	0.05
5.45	5.52	0.07
Tolerance Limit		±0.20

Remarks: (1) Maxium tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of Pilot Testing Limited will be followed.
 (2) Displayed reading presents the figures shown on item under calibration/checking regardless of equipment precision or significant figures.
 (3) Because of high sensitivity and ease of measurement, the conductivity method (accorndg to APHA 19e 2510) is used to determine salinity.

- End of Report -



EQUIPMENT PERFORMANCE CHECK / CALIBRATION REPORT

Report No. : HK1810025
 Project Name : EQUIPMENT PERFORMANCE CHECK/CALIBRATION REPORT
 Date of Issue : 08/01/2018

Customer : LAM ENVIRONMENTAL SERVICES LIMITED
 Address : 11/F., CENTRE POINT, 181-185 GLOUCESTER ROAD, WAN CHAI, HONG KONG

Calibration Job No. : HK1810025
 Test Item No. : HK1810025-01
 Test Item Details
 Test Item Description : Sonde
 Manufacturer : YSI
 Model No. : Professional Plus
 Serial No. : 14M100277
 Performance Method : Checked according to in-house method CAL005
 (References: Temperature (Section 6 of International Accreditation New Zealand Technical Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure), pH value (APHA 21e 4500H:B), Salinity (Refer to Conductivity APHA 19e 2510B) , Dissolved oxygen (APHA 19e 4500-O,C))

Test Item Receipt Date : 05/01/2018
 Test Item Calibration Date : 05/01/2018

- Notes :
1. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.
 2. Results relate to item(s) as received.
 3. \pm indicates the tolerance limit
 4. N/A = Not applicable
 5. APHA - American Public Health Association, American Water Works Association and Water Environment Federation, Standard Methods for the Examination of Water and Wastewater, APHA-AWWA-WEF, USA
 6. DO, pH, salinity and temperature performance check was conducted by Pilot Testing Limited.
 7. Because of high sensitivity and ease of measurement, the conductivity method (according to APHA 19e 2510) is used to determine salinity.

Approved Signatory :

Ms. Wong Po Yan, Pauline
 (Assistant Laboratory Manager)

Issue Date: 08/01/2018

Pilot Testing Limited

Address: Room B12, Block B, 5/F, Tonic Industrial Centre, 19 Lam Hing Street, Kowloon Bay, Kowloon
 Tel: (852) 2527 6691 email: test@pilot-testing.com


REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1810025
DATE OF ISSUE: 08/01/2018
CLIENT: LAM ENVIRONMENTAL SERVICES LIMITED

Equipment Type	Sonde
Manufacturer	YSI
Model No.	Professional Plus
Serial No.	14M100277
Date of Calibration	05-Jan-18
Date of next Calibration	05-Apr-18

Parameters:

Temperature (Method Ref: Section 6 of International Accreditation New Zealand Technical Guide No.3 Second edition March 2008: Working Thermometer Calibration Procedure)

Reference Reading (°C)	Display Reading (°C)	Deviation (°C)
5.2	5.2	0.0
13.6	13.6	0.0
22.7	22.7	0.0
Tolerance Limit		±2.0

pH Value (Method Ref: APHA21e, 4500H:B)

Expected Reading (pH unit)	Reference Reading (pH unit)	Display Reading (pH unit)	Deviation (pH unit)
4.0	3.98	4.07	0.09
7.0	7.11	7.10	-0.01
10.0	10.07	10.09	0.02
Tolerance Limit			±0.20

Conductivity (Method Ref: APHA 19e, 2510)

KCl concentration (mol/L)	Reference Reading (ms/cm)	Display Reading (ms/cm)	Deviation (%)
0.0000	0.00	0.00	--
0.1000	11.3	11.2	-0.62
0.2000	23.2	23.3	0.43
0.5000	51.9	52.4	0.96
Tolerance Limit			±2.0

Dissolved Oxygen (DO) (Method Ref: APHA 19e, 4500-O, C)

Reference DO reading (mg/L)	DO reading od DO probe (mg/L)	Deviation (mg/L)
8.10	8.13	0.03
7.72	7.65	-0.07
4.48	4.40	-0.08
Tolerance Limit		±0.20

- Remarks:
- (1) Maxium tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of Pilot Testing Limited will be followed.
 - (2) Displayed reading presents the figures shown on item under calibration/checking regardless of equipment precision or significant figures.
 - (3) Because of high sensitivity and ease of measurement, the conductivity method (according to APHA 19e 2510) is used to determine salinity.

- End of Report -



EQUIPMENT PERFORMANCE CHECK / CALIBRATION REPORT

Report No. : HK1810333
Project Name : EQUIPMENT PERFORMANCE CHECK/CALIBRATION REPORT
Date of Issue : 9/4/2018

Customer : LAM ENVIRONMENTAL SERVICES LIMITED
Address : 11/F., CENTRE POINT, 181-185 GLOUCESTER ROAD, WAN CHAI, HONG KONG

Calibration Job No. : HK1810333
Test Item No. : HK1810333-01
Test Item Details
Test Item Description : Sonde
Manufacturer : YSI
Model No. : Professional Plus
Serial No. : 14M100277
Performance Method : Checked according to in-house method CAL005
 (References: Temperature (Section 6 of International Accreditation New Zealand Technical Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure), pH value (APHA 21e 4500H:B), Salinity (Refer to Conductivity APHA 19e 2510B) , Dissolved oxygen (APHA 19e 4500-O,C))
Test Item Receipt Date : 6/4/2018
Test Item Calibration Date : 6/4/2018

- Notes :
1. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.
 2. Results relate to item(s) as received.
 3. \pm indicates the tolerance limit
 4. N/A = Not applicable
 5. APHA - American Public Health Association, American Water Works Association and Water Environment Federation, Standard Methods for the Examination of Water and Wastewater, APHA-AWWA-WEF. USA
 6. DO, pH, salinity and temperature performance check was conducted by Pilot Testing Limited.
 7. Because of high sensitivity and ease of measurement, the conductivity method (according to APHA 19e 2510) is used to determine salinity.

Approved Signatory

:

Ms. Wong Po Yan, Pauline
(Assistant Laboratory Manager)

Issue Date:

9/4/2018


REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1810333
DATE OF ISSUE: 9/4/2018
CLIENT: LAM ENVIRONMENTAL SERVICES LIMITED

Equipment Type	Sonde
Manufacturer	YSI
Model No.	Professional Plus
Serial No.	14M100277
Date of Calibration	06-Apr-18
Date of next Calibration	06-Jul-18

Parameters:

Temperature (Method Ref: Section 6 of International Accreditation New Zealand Technical Guide No.3 Second edition March 2008: Working Thermometer Calibration Procedure)

Reference Reading (°C)	Display Reading (°C)	Deviation (°C)
4.6	4.6	0.0
15.0	14.8	-0.1
25.1	25.1	0.0
Tolerance Limit		±2.0

pH Value (Method Ref: APHA21e, 4500H:B)

Expected Reading (pH unit)	Reference Reading (pH unit)	Display Reading (pH unit)	Deviation (pH unit)
4.0	4.06	4.08	0.02
7.0	7.02	7.09	0.07
10.0	9.97	10.00	0.03
Tolerance Limit			±0.20

Conductivity (Method Ref: APHA 19e, 2510)

KCl concentration (mol/L)	Reference Reading (ms/cm)	Display Reading (ms/cm)	Deviation (%)
0.0000	0.00	0.00	--
0.1000	12.2	12.1	-0.98
0.2000	24.8	24.6	-0.65
0.5000	54.5	54.1	-0.73
Tolerance Limit			±2.0

Dissolved Oxygen (DO) (Method Ref: APHA 19e, 4500-O, C)

Reference DO reading (mg/L)	DO reading od DO probe (mg/L)	Deviation (mg/L)
8.18	8.22	0.04
6.66	6.52	-0.14
4.75	4.81	0.06
Tolerance Limit		±0.20

- Remarks:
- (1) Maximum tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of Pilot Testing Limited will be followed.
 - (2) Displayed reading presents the figures shown on item under calibration/checking regardless of equipment precision or significant figures.
 - (3) Because of high sensitivity and ease of measurement, the conductivity method (according to APHA 19e 2510) is used to determine salinity.

- End of Report -



EQUIPMENT PERFORMANCE CHECK / CALIBRATION REPORT

Report No. : HK1711081
Project Name : EQUIPMENT PERFORMANCE CHECK/CALIBRATION REPORT
Date of Issue : 27/12/2017

Customer : LAM ENVIRONMENTAL SERVICES LIMITED
Address : 11/F., CENTRE POINT, 181-185 GLOUCESTER ROAD, WAN CHAI, HONG KONG

Calibration Job No. : HK1711081
Test Item No. : HK1711081-01
Test Item Details
Test Item Description : Sonde
Manufacturer : YSI
Model No. : Professional Plus
Serial No. : 17F100236
Performance Method : Checked according to in-house method CAL005
 (References: Temperature (Section 6 of International Accreditation New Zealand Technical Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure), pH value (APHA 21e 4500H:B), Salinity (Refer to Conductivity APHA 19e 2510B) , Dissolved oxygen (APHA 19e 4500-O,C))

Test Item Receipt Date : 21/12/2017
Test Item Calibration Date : 22/12/2017

- Notes :
1. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.
 2. Results relate to item(s) as received.
 3. ± indicates the tolerance limit
 4. N/A = Not applicable
 5. APHA - American Public Health Association, American Water Works Association and Water Environment Federation, Standard Methods for the Examination of Water and Wastewater, APHA-AWWA-WEF. USA
 6. DO, pH, salinity and temperature performance check was conducted by Pilot Testing Limited.
 7. Because of high sensitivity and ease of measurement, the conductivity method (according to APHA 19e 2510) is used to determine salinity.

Approved Signatory

:

Ms. Wong Po Yan, Pauline
(Assistant Laboratory Manager)

Issue Date:

27/12/2017


REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1711081
DATE OF ISSUE: 27/12/2017
CLIENT: LAM ENVIRONMENTAL SERVICES LIMITED

Equipment Type	Sonde
Manufacturer	YSI
Model No.	Professional Plus
Serial No.	17F100236
Date of Calibration	22-Dec-17
Date of next Calibration	22-Mar-18

Parameters:

Temperature (Method Ref: Section 6 of International Accreditation New Zealand Technical Guide No.3 Second edition March 2008: Working Thermometer Calibration Procedure)

Reference Reading (°C)	Display Reading (°C)	Deviation (°C)
5.9	5.9	0.0
15.1	15.1	0.0
28.0	28.0	0.0
Tolerance Limit		±2.0

pH Value (Method Ref: APHA21e, 4500H:B)

Expected Reading (pH unit)	Reference Reading (pH unit)	Display Reading (pH unit)	Deviation (pH unit)
4.0	4.07	3.95	-0.12
7.0	7.02	6.90	-0.12
10.0	10.03	10.04	0.01
Tolerance Limit			±0.20

Conductivity (Method Ref: APHA 19e, 2510)

KCl concentration (mol/L)	Reference Reading (ms/cm)	Display Reading (ms/cm)	Deviation (%)
0.0000	0.00	0.00	--
0.1000	11.4	11.2	-1.75
0.2000	22.8	22.7	-0.44
0.5000	57.3	56.8	-0.87
Tolerance Limit			±2.0

Dissolved Oxygen (DO) (Method Ref: APHA 19e, 4500-O, C)

Reference DO reading (mg/L)	DO reading od DO probe (mg/L)	Deviation (mg/L)
7.37	7.40	0.03
6.62	6.57	-0.05
5.45	5.51	0.06
Tolerance Limit		±0.20

- Remarks:
- (1) Maxium tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of Pilot Testing Limited will be followed.
 - (2) Displayed reading presents the figures shown on item under calibration/checking regardless of equipment precision or significant figures.
 - (3) Because of high sensitivity and ease of measurement, the conductivity method (according to APHA 19e 2510) is used to determine salinity.

- End of Report -



EQUIPMENT PERFORMANCE CHECK / CALIBRATION REPORT

Report No. : HK1810254
Project Name : EQUIPMENT PERFORMANCE CHECK/CALIBRATION REPORT
Date of Issue : 14/03/2018

Customer : LAM ENVIRONMENTAL SERVICES LIMITED
Address : 11/F., CENTRE POINT, 181-185 GLOUCESTER ROAD, WAN CHAI, HONG KONG

Calibration Job No. : HK1810254
Test Item No. : HK1810254-01
Test Item Details
Test Item Description : Sonde
Manufacturer : YSI
Model No. : Professional Plus
Serial No. : 17F100236
Performance Method : Checked according to in-house method CAL005
(References: Temperature (Section 6 of International Accreditation New Zealand Technical Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure), pH value (APHA 21e 4500H:B), Salinity (Refer to Conductivity APHA 19e 2510B) , Dissolved oxygen (APHA 19e 4500-O,C))

Test Item Receipt Date : 13/03/2018
Test Item Calibration Date : 14/03/2018

- Notes :
1. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.
 2. Results relate to item(s) as received.
 3. \pm indicates the tolerance limit
 4. N/A = Not applicable
 5. APHA - American Public Health Association, American Water Works Association and Water Environment Federation, Standard Methods for the Examination of Water and Wastewater, APHA-AWWA-WEF. USA
 6. DO, pH, salinity and temperature performance check was conducted by Pilot Testing Limited.
 7. Because of high sensitivity and ease of measurement, the conductivity method (according to APHA 19e 2510) is used to determine salinity.

Approved Signatory :

Issue Date:

14/03/2018

 Ms. Wong Po Yan, Pauline
 (Assistant Laboratory Manager)


REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1810254
DATE OF ISSUE: 14/03/2018
CLIENT: LAM ENVIRONMENTAL SERVICES LIMITED

Equipment Type	Sonde
Manufacturer	YSI
Model No.	Professional Plus
Serial No.	17F100236
Date of Calibration	14-Mar-18
Date of next Calibration	14-Jun-18

Parameters:

Temperature (Method Ref: Section 6 of International Accreditation New Zealand Technical Guide No.3 Second edition March 2008: Working Thermometer Calibration Procedure)

Reference Reading (°C)	Display Reading (°C)	Deviation (°C)
5.8	5.8	0.0
16.1	16.1	0.0
25.5	25.5	0.0
	Tolerance Limit	±2.0

pH Value (Method Ref: APHA21e, 4500H:B)

Expected Reading (pH unit)	Reference Reading (pH unit)	Display Reading (pH unit)	Deviation (pH unit)
4.0	4.00	4.04	0.04
7.0	7.10	7.16	0.06
10.0	10.02	10.02	0.00
	Tolerance Limit		±0.20

Conductivity (Method Ref: APHA 19e, 2510)

KCl concentration (mol/L)	Reference Reading (ms/cm)	Display Reading (ms/cm)	Deviation (%)
0.0000	0.00	0.00	--
0.1000	11.6	11.5	-0.86
0.2000	23.1	22.8	-1.30
0.5000	50.2	50.0	-0.40
	Tolerance Limit		±2.0

Dissolved Oxygen (DO) (Method Ref: APHA 19e, 4500-O, C)

Reference DO reading (mg/L)	DO reading od DO probe (mg/L)	Deviation (mg/L)
7.88	7.90	0.02
6.94	6.93	-0.01
4.68	4.79	0.11
	Tolerance Limit	±0.20

- Remarks:
- (1) Maximum tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of Pilot Testing Limited will be followed.
 - (2) Displayed reading presents the figures shown on item under calibration/checking regardless of equipment precision or significant figures.
 - (3) Because of high sensitivity and ease of measurement, the conductivity method (according to APHA 19e 2510) is used to determine salinity.

- End of Report -