



# 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: <b>3166</b>		

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
<b>QSTD</b>	<b>m=</b>	<b>2.12231</b>	<b>QA</b>	<b>m=</b>	<b>1.32895</b>
	<b>b=</b>	<b>-0.06016</b>		<b>b=</b>	<b>-0.03719</b>
	<b>r=</b>	<b>0.99999</b>		<b>r=</b>	<b>0.99999</b>

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 Calibration Date : 19-Oct-18  
 Equipment no. : HVS001 Calibration Due Date : 19-Dec-18

#### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition				
Temperature, $T_a$	297.2	Kelvin	Pressure, $P_a$	1017 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori002	Slope, $m_c$	2.12231	Intercept, $b_c$	-0.06018
Last Calibration Date	19-Jan-18	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $m_c \times Q_{std} + b_c$			
Next Calibration Date	19-Jan-19				

Calibration of TSP						
Calibration Point	Manometer Reading			$Q_{std}$ ( $m^3 / min.$ ) X-axis	Continuous Flow Recorder, W (CFM)	IC ( $W(P_a/1013.3 \times 298/T_a)^{0.3531}$ ) Y-axis
	(up)	(down)	(difference)			
1	1.7	1.7	3.4	0.9000	27	27.0883
2	2.5	2.5	5.0	1.0854	33	33.1079
3	4.0	4.0	8.0	1.3654	43	43.1406
4	5.3	5.3	10.6	1.5674	49	49.1602
5	6.8	6.8	13.2	1.7458	55	55.1799

By Linear Regression of Y on X

Slope,  $m$  = 33.2775 Intercept,  $b$  = -2.6174  
 Correlation Coefficient\* = 0.9997  
 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 : Ray Lee Checked by : Pui-lin Wong  
 Date : 19-Oct-18 Date : 19-Oct-18



Lam Environmental Services Limited

**Calibration Data for High Volume Sampler (TSP Sampler)**

Location : CMA1b Calibration Date : 19-Dec-18  
 Equipment no. : HVS001 Calibration Due Date : 18-Feb-19

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, T <sub>a</sub>	293	Kelvin	Pressure, P <sub>a</sub>
			1020 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori3166	Slope, m <sub>c</sub>	2.12231	Intercept, b <sub>c</sub>	-0.06016
Last Calibration Date	24-Jan-18	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	24-Jan-19				

Calibration of TSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC $W(P_a/1013.3 \times 298/T_a)^{1/2}/35.3$ Y-axis
	(up)	(down)	(difference)			
1	1.6	1.6	3.2	0.8812	26	26.3074
2	2.7	2.7	5.4	1.1362	34	34.4020
3	4.0	4.0	8.0	1.3768	45	45.5321
4	5.2	5.2	10.4	1.5658	48	48.5676
5	6.3	6.3	12.6	1.7207	54	54.6385

By Linear Regression of Y on X

Slope, m = 33.7706 Intercept, b = -3.2329  
 Correlation Coefficient\* = 0.9933  
 Calibration Accepted = Yes/No\*\*

\* if Correlation Coefficient &lt; 0.990, check and recalibration again.

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Henry Lau Checked by : Chan Ka Chun  
 Date : 19-Dec-18 Date : 19-Dec-18



### Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA2a  
 Equipment no. : HVS002  
 Calibration Date : 19-Oct-18  
 Calibration Due Date : 19-Dec-18

#### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, $T_a$	297.2	Kelvin	Pressure, $P_a$
			1017 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori002	Slope, $m_c$	2.12231	Intercept, $b_c$	-0.06016
Last Calibration Date	19-Jan-18	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $m_c \times Q_{std} + b_c$			
Next Calibration Date	19-Jan-19				

Calibration of TSP						
Calibration Point	Manometer Reading H (inches of water)			$Q_{std}$ ( $m^3 / min.$ ) X-axis	Continuous Flow Recorder, W (CFM)	IC ( $(W/P_a) \times 1013.3 \times 298 / T_a)^{1/2} \times 35.31$ ) Y-axis
	(up)	(down)	(difference)			
1	1.6	1.6	3.2	0.8740	27	27.0883
2	2.6	2.6	5.2	1.1063	34	34.1112
3	4.0	4.0	8.0	1.3654	42	42.1373
4	5.2	5.2	10.4	1.5528	50	50.1635
5	6.5	6.5	13.0	1.7328	54	54.1766

By Linear Regression of Y on X

Slope, m = 32.4470      Intercept, b = -1.4980  
 Correlation Coefficient\* = 0.9975  
 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 : Ray Lee      Checked by : Pualine Wong  
 Date : 19-Oct-18      Date : 19-Oct-18



Lam Environmental Services Limited

**Calibration Data for High Volume Sampler (TSP Sampler)**

Location : CMA2a Calibration Date : 19-Dec-18  
 Equipment no. : HVS002 Calibration Due Date : 18-Feb-19

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, T <sub>a</sub>	293	Kelvin	Pressure, P <sub>a</sub>
			1020 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori3166	Slope, m <sub>c</sub>	2.12231	Intercept, b <sub>c</sub>	-0.06016
Last Calibration Date	24-Jan-18	$\left( H \times P_a / 1013.3 \times 298 / T_a \right)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	24-Jan-19				

Calibration of TSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31) Y-axis
	(up)	(down)	(difference)			
1	1.5	1.5	3.0	0.8541	28	28.3311
2	2.2	2.2	4.4	1.0284	32	32.3784
3	3.7	3.7	7.4	1.3253	40	40.4730
4	4.5	4.5	9.0	1.4586	44	44.5203
5	6.0	6.0	12.0	1.6799	52	52.6149

By Linear Regression of Y on X

Slope, m = 29.0948 Intercept, b = 2.7348  
 Correlation Coefficient\* = 0.9963  
 Calibration Accepted = Yes/No\*\*

\* if Correlation Coefficient &lt; 0.990, check and recalibration again.

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Henry Lau Checked by : Chan Ka Chun  
 Date : 19-Dec-18 Date : 19-Dec-18



### Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA3a  
 Equipment no. : HVS012  
 Calibration Date : 19-Oct-18  
 Calibration Due Date : 19-Dec-18

#### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, $T_a$	297.2	Kelvin	Pressure, $P_a$
			1017 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori002	Slope, $m_c$	2.12231	Intercept, $b_c$	-0.06016
Last Calibration Date	19-Jan-18	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $m_c \times Q_{std} + b_c$			
Next Calibration Date	19-Jan-19				

Calibration of TSP						
Calibration Point	Manometer Reading			$Q_{std}$ ( $m^3 / min.$ ) X-axis	Continuous Flow Recorder, W (CFM)	IC ( $(W/P_a) \times 1013.3 \times 298 / T_a)^{1/2} \times 35.31$ ) Y-axis
	(up)	(down)	(difference)			
1	1.4	1.4	2.8	0.8194	32	32.1046
2	2.2	2.2	4.4	1.0199	38	38.1243
3	3.4	3.4	6.8	1.2611	44	44.1439
4	4.3	4.3	8.6	1.4146	50	50.1635
5	5.4	5.4	10.8	1.5819	56	56.1831

By Linear Regression of Y on X

Slope, m = 31.1434      Intercept, b = 6.1682  
 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 EL333 to HVS012 with respect to the update in quality management system.

Calibrated by : Ray Lee      Checked by : Pualine Wong  
 Date : 19-Oct-18      Date : 19-Oct-18



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**Calibration Data for High Volume Sampler (TSP Sampler)**

Location : CMA3a Calibration Date : 19-Dec-18  
 Equipment no. : HVS012 Calibration Due Date : 18-Feb-19

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, T <sub>a</sub>	293	Kelvin	Pressure, P <sub>a</sub>
			1020 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori3166	Slope, m <sub>c</sub>	2.12231	Intercept, bc	-0.06016
Last Calibration Date	24-Jan-18	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	24-Jan-19				

Calibration of TSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31) Y-axis
	(up)	(down)	(difference)			
1	1.2	1.2	2.4	0.7669	20	20.2365
2	2.0	2.0	4.0	0.9819	28	28.3311
3	3.5	3.5	7.0	1.2897	37	37.4375
4	4.5	4.5	9.0	1.4586	41	41.4848
5	5.5	5.5	11.0	1.6096	50	50.5912

By Linear Regression of Y on X

Slope, m = 33.7811 Intercept, b = -5.6420  
 Correlation Coefficient\* = 0.9918  
 Calibration Accepted = Yes/No\*\*

\* if Correlation Coefficient &lt; 0.990, check and recalibration again.

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Henry Lau Checked by : Chan Ka Chun  
 Date : 19-Dec-18 Date : 19-Dec-18



### Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA4a  
 Equipment no. : HVS004  
 Calibration Date : 19-Oct-18  
 Calibration Due Date : 19-Dec-18

#### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, $T_a$	297.2	Kelvin	Pressure, $P_a$
			1017 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori002	Slope, $m_c$	2.12231	Intercept, $b_c$	-0.06016
Last Calibration Date	19-Jan-18	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $m_c \times Q_{std} + b_c$			
Next Calibration Date	19-Jan-19				

Calibration of TSP						
Calibration Point	Manometer Reading H (inches of water)			$Q_{std}$ ( $m^3 / min.$ ) X-axis	Continuous Flow Recorder, W (CFM)	IC ( $(W/P_a) \times 1013.3 \times 298 / T_a^{1/2} \times 35.31$ ) Y-axis
	(up)	(down)	(difference)			
1	1.5	1.5	3.0	0.8471	22	22.0719
2	2.2	2.2	4.4	1.0199	31	31.1014
3	3.4	3.4	6.8	1.2611	41	41.1341
4	4.7	4.7	9.4	1.4777	50	50.1635
5	6.0	6.0	12.0	1.6659	56	56.1631

By Linear Regression of Y on X

Slope, m = 41.6384      Intercept, b = -12.0983  
 Correlation Coefficient\* = 0.9974  
 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 : Ray Lee      Checked by : Pusline Wong  
 Date : 19-Oct-18      Date : 19-Oct-18





Lam Environmental Services Limited

**Calibration Data for High Volume Sampler (TSP Sampler)**

Location : CMA4a Calibration Date : 19-Dec-18  
 Equipment no. : HVS004 Calibration Due Date : 18-Feb-19

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, T <sub>a</sub>	293	Kelvin	Pressure, P <sub>a</sub>
			1020 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori3166	Slope, m <sub>c</sub>	2.12231	Intercept, b <sub>c</sub>	-0.06016
Last Calibration Date	24-Jan-18	$\left( \frac{H \times P_a}{1013.3 \times 298 / T_a} \right)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	24-Jan-19				

Calibration of TSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31) Y-axis
	(up)	(down)	(difference)			
1	1.5	1.5	3.0	0.8541	24	24.2838
2	2.0	2.0	4.0	0.9819	31	31.3666
3	3.6	3.6	7.2	1.3076	40	40.4730
4	4.2	4.2	8.4	1.4101	47	47.5558
5	5.7	5.7	11.4	1.6381	56	56.6622

By Linear Regression of Y on X

Slope, m = 39.8624 Intercept, b = -9.2955  
 Correlation Coefficient\* = 0.9932  
 Calibration Accepted = Yes/No\*\*

\* if Correlation Coefficient &lt; 0.990, check and recalibration again.

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Henry Lau Checked by : Chan Ka Chun  
 Date : 19-Dec-18 Date : 19-Dec-18



### Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA5b  
 Equipment no. : HVS010  
 Calibration Date : 19-Oct-18  
 Calibration Due Date : 19-Dec-18

#### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, $T_a$	297.2	Kelvin	Pressure, $P_a$
			1017 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori002	Slope, $m_c$	2.12231	Intercept, $b_c$	-0.06016
Last Calibration Date	19-Jan-18	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $m_c \times Q_{std} + b_c$			
Next Calibration Date	19-Jan-19				

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	1.3	1.3	2.6	0.7906	33	33.1079
2	2.0	2.0	4.0	0.9738	38	38.1243
3	3.2	3.2	6.4	1.2243	45	45.1472
4	4.2	4.2	8.4	1.3984	50	50.1635
5	5.3	5.3	10.6	1.5674	55	55.1799

By Linear Regression of Y on X

Slope,  $m$  = 28.3797      Intercept,  $b$  = 10.5471  
 Correlation Coefficient\* = 0.9999  
 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 : Ray Lee      Checked by : Pualine Wong  
 Date : 19-Oct-18      Date : 19-Oct-18



Lam Environmental Services Limited

### Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA5b Calibration Date : 19-Dec-18  
 Equipment no. : HVS010 Calibration Due Date : 18-Feb-19

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, T <sub>a</sub>	293	Kelvin	Pressure, P <sub>a</sub>
			1020 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori3166	Slope, m <sub>c</sub>	2.12231	Intercept, b <sub>c</sub>	-0.06016
Last Calibration Date	24-Jan-18	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	24-Jan-19				

Calibration of TSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / 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	1.5	1.5	3.0	0.8541	25	25.2956
2	2.8	2.8	5.6	1.1566	34	34.4020
3	3.6	3.6	7.2	1.3076	38	38.4493
4	4.8	4.8	9.6	1.5055	46	46.5439
5	6.0	6.0	12.0	1.6799	54	54.6385

By Linear Regression of Y on X

Slope, m = 35.1088 Intercept, b = -5.8015  
 Correlation Coefficient\* = 0.9935  
 Calibration Accepted = Yes/No\*\*

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

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Henry Lau Checked by : Chan Ka Chun  
 Date : 19-Dec-18 Date : 19-Dec-18



### Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA6a  
 Equipment no. : HVS013  
 Calibration Date : 19-Oct-18  
 Calibration Due Date : 19-Dec-18

#### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, $T_a$	297.2	Kelvin	Pressure, $P_a$
			1017 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori002	Slope, $m_c$	2.12231	Intercept, $b_c$	-0.08016
Last Calibration Date	19-Jan-18	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $m_c \times Q_{std} + b_c$			
Next Calibration Date	19-Jan-19				

Calibration of TSP						
Calibration Point	Manometer Reading H (inches of water)			$Q_{std}$ ( $m^3 / min.$ ) X-axis	Continuous Flow Recorder, W (CFM)	IC ( $(W/P_a)(1013.3 \times 298 / T_a)^{1/2} / 0.3531$ ) Y-axis
	(up)	(down)	(difference)			
1	1.4	1.4	2.8	0.8194	30	30.0981
2	2.3	2.3	4.6	1.0422	36	36.1177
3	3.7	3.7	7.4	1.3143	44	44.1439
4	4.8	4.8	9.6	1.4930	48	48.1570
5	6.1	6.1	12.2	1.8795	54	54.1766

By Linear Regression of Y on X

Slope, m = 27.7403      Intercept, b = 7.3172  
 Correlation Coefficient\* = 0.9992  
 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 : Ray Lee      Checked by : Pualine Wong  
 Date : 19-Oct-18      Date : 19-Oct-18



Lam Environmental Services Limited

**Calibration Data for High Volume Sampler (TSP Sampler)**

Location : CMA6a Calibration Date : 19-Dec-18  
 Equipment no. : HVS013 Calibration Due Date : 18-Feb-19

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, T <sub>a</sub>	293	Kelvin	Pressure, P <sub>a</sub>
			1020 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori3166	Slope, m <sub>c</sub>	2.12231	Intercept, b <sub>c</sub>	-0.06016
Last Calibration Date	24-Jan-18	$\left( \frac{H \times P_a}{1013.3 \times 298 / T_a} \right)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	24-Jan-19				

Calibration of TSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / 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	1.4	1.4	2.8	0.8261	28	28.3311
2	2.3	2.3	4.6	1.0509	33	33.3902
3	3.7	3.7	7.4	1.3253	41	41.4848
4	4.8	4.8	9.6	1.5055	46	46.5439
5	6.0	6.0	12.0	1.6799	54	54.6385

By Linear Regression of Y on X

Slope, m = 30.1687 Intercept, b = 2.3363  
 Correlation Coefficient\* = 0.9927  
 Calibration Accepted = Yes/No\*\*

\* if Correlation Coefficient &lt; 0.990, check and recalibration again.

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Henry Lau Checked by : Chan Ka Chun  
 Date : 19-Dec-18 Date : 19-Dec-18



## 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:  $21 \pm 1$  °C  
Relative humidity:  $50 \pm 10$  %  
Air pressure:  $1005 \pm 5$  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  $\pm 20\%$ .
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 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:





## 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 <sup>3</sup> at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10 <sup>4</sup> 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.: 18CA0510 04 Page 1 of 2

### Item tested

Description:	Sound Level Meter (Type 1)	Microphone:	Preamp:
Manufacturer:	Larson Davis	PCB	PCB
Type/Model No.:	LxT1	377B02	PRMLxT1L
Serial/Equipment No.:	0004796	155507	042621
Adaptors used:	-	-	-

### Item submitted by

Customer Name: Lam Geotechnics Ltd  
Address of Customer: -  
Request No.: -  
Date of receipt: 10-May-2018

Date of test: 11-May-2018

### Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2268444	08-Sep-2018	CIGISMEC
Signal generator	DS 360	61227	23-Apr-2019	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 ±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 responses 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 Junqi

Date: 11-May-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.: 18CA0510 04

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	2.2
Linearity range for Leq	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
	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	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
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 <sup>3</sup> at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10 <sup>4</sup> 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: 11-May-2018

Fung Chi Yip

Checked by:

Date: 11-May-2018

Shek Kwong Tai

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.

# Calibration Certificate

Certificate Number 2018010851

**Customer:**

LAM Environmental Services Ltd  
11/F Centre Point  
181-185 Gloucester Road  
Wanchai, , Hong Kong

**Model Number** CAL200  
**Serial Number** 13098  
**Test Results** Pass

**Initial Condition** Inoperable

**Description** Larson Davis CAL200 Acoustic Calibrator

**Procedure Number** D0001.8386  
**Technician** Scott Montgomery  
**Calibration Date** 29 Oct 2018  
**Calibration Due**  
**Temperature** 23 °C ± 0.3 °C  
**Humidity** 34 %RH ± 3 %RH  
**Static Pressure** 101.2 kPa ± 1 kPa

**Evaluation Method** The data is acquired by the insert voltage calibration method using the reference microphone's open circuit sensitivity. Data reported in dB re 20 µPa.

**Compliance Standards** Compliant to Manufacturer Specifications per D0001.8190 and the following standards:  
IEC 60942:2017 ANSI S1.40-2006

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005. **Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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## Standards Used

Description	Cal Date	Cal Due	Cal Standard
Agilent 34401A DMM	09/06/2018	09/06/2019	001021
Larson Davis Model 2900 Real Time Analyzer	04/10/2018	04/10/2019	001051
Microphone Calibration System	03/07/2018	03/07/2019	005446
1/2" Preamplifier	09/20/2018	09/20/2019	006506
Larson Davis 1/2" Preamplifier 7-pin LEMO	08/07/2018	08/07/2019	006507
1/2 inch Microphone - RI - 200V	05/10/2018	05/10/2019	006510
Pressure Transducer	07/18/2018	07/18/2019	007368

Larson Davis, a division of PCB Piezotronics, Inc  
1681 West 820 North  
Provo, UT 84601, United States  
716-684-0001



**LARSON DAVIS**  
A PCB PIEZOTRONICS DIV.



**REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION**

**WORK ORDER:** HK1811147  
**DATE OF ISSUE:** 19/11/2018  
**CLIENT:** LAM GEOTECHNICS LIMITED

<b>Equipment Type:</b>	Turbidimeter
<b>Brand Name:</b>	Xin Rui
<b>Model No.:</b>	WGZ-3B
<b>Serial No.:</b>	1403009
<b>Equipment No.:</b>	---
<b>Date of Calibration:</b>	19/11/2018
<b>Date of next Calibration:</b>	19/02/2019

**Parameters:**
**Turbidity**

 Method Ref: APHA 22<sup>nd</sup> ed. 2130B

Expected Reading (NTU)	Display Reading (NTU)	Tolerance
0	0.00	---
4	3.98	-0.5%
10	10.12	1.2%
40	43.50	8.8%
100	103.00	3.0%
400	396	-1.0%
1000	925	-7.5%
	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:** HK1811031  
**CLIENT:** LAM GEOTECHNICS LIMITED  
**DATE RECEIVED:** 11/10/2018  
**DATE OF ISSUE:** 12/10/2018  
**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.

<b>Scope of Test:</b>	Turbidity
<b>Equipment Type:</b>	Turbidity Meter
<b>Brand Name:</b>	PCE Instruments
<b>Model No.:</b>	PCE-TUM 20
<b>Serial No.:</b>	Q942542
<b>Equipment No.:</b>	---
<b>Date of Calibration:</b>	12/10/2018

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: 12/10/2018

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**REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION**

**WORK ORDER:** HK1811031  
**DATE OF ISSUE:** 12/10/2018  
**CLIENT:** LAM GEOTECHNICS LIMITED

<b>Equipment Type:</b>	Turbidity Meter
<b>Brand Name:</b>	PCE Instruments
<b>Model No.:</b>	PCE-TUM 20
<b>Serial No.:</b>	Q942542
<b>Equipment No.:</b>	---
<b>Date of Calibration:</b>	12/10/2018
<b>Date of next Calibration:</b>	12/01/2019

**Parameters:**
**Turbidity**

 Method Ref: APHA 22<sup>nd</sup> ed. 2130B

Expected Reading (NTU)	Display Reading (NTU)	Tolerance
0	0.00	---
10	10.50	5.0%
20	20.50	2.5%
40	41.48	3.7%
100	99	-1.0%
400	401	0.3%
800	788	-1.5%
	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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## EQUIPMENT PERFORMANCE CHECK / CALIBRATION REPORT

**Report No.** : HK1811019  
**Project Name** : EQUIPMENT PERFORMANCE CHECK/CALIBRATION REPORT  
**Date of Issue** : 11/10/2018

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

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**Calibration Job No.** : HK1811019  
**Test Item No.** : HK1811019-01  
**Test Item Details**  
**Test Item Description** : Sonde  
**Manufacturer** : YSI  
**Model No.** : Professional Plus  
**Serial No.** : 14K100322  
**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))

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**Test Item Receipt Date** : 9/10/2018  
**Test Item Calibration Date** : 10/10/2018

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- 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:

11/10/2018


**REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION**

**WORK ORDER:** HK1811019  
**DATE OF ISSUE:** 11/10/2018  
**CLIENT:** LAM ENVIRONMENTAL SERVICES LIMITED

<b>Equipment Type</b>	Sonde
<b>Manufacturer</b>	YSI
<b>Model No.</b>	Professional Plus
<b>Serial No.</b>	14K100322
<b>Date of Calibration</b>	10-Oct-18
<b>Date of next Calibration</b>	10-Jan-19

**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)
8.8	8.8	0.0
15.3	15.2	-0.1
25.4	25.3	-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	4.01	3.98	-0.03
7.0	6.99	7.02	0.03
10.0	10.02	10.03	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	12.3	12.3	-0.16
0.2000	24.0	23.9	-0.33
0.5000	57.1	57.2	0.18
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)
7.00	7.01	0.01
6.41	6.43	0.02
4.46	4.41	-0.05
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

<b>Report No.</b>	: HK1811027
<b>Project Name</b>	: EQUIPMENT PERFORMANCE CHECK/CALIBRATION REPORT
<b>Date of Issue</b>	: 11/10/2018
<b>Customer</b>	: LAM ENVIRONMENTAL SERVICES LIMITED
<b>Address</b>	: 11/F., CENTRE POINT, 181-185 GLOUCESTER ROAD, WAN CHAI, HONG KONG
<hr/>	
<b>Calibration Job No.</b>	: HK1811027
<b>Test Item No.</b>	: HK1811027-01
<b>Test Item Details</b>	
<b>Test Item Description</b>	: Sonde
<b>Manufacturer</b>	: YSI
<b>Model No.</b>	: Professional Plus
<b>Serial No.</b>	: 14M100277
<b>Performance Method</b>	: 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))
<b>Test Item Receipt Date</b>	: 11/10/2018
<b>Test Item Calibration Date</b>	: 11/10/2018

- 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: 11/10/2018


**REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION**

**WORK ORDER:** HK1811027  
**DATE OF ISSUE:** 11/10/2018  
**CLIENT:** LAM ENVIRONMENTAL SERVICES LIMITED

<b>Equipment Type</b>	Sonde
<b>Manufacturer</b>	YSI
<b>Model No.</b>	Professional Plus
<b>Serial No.</b>	14M100277
<b>Date of Calibration</b>	11-Oct-18
<b>Date of next Calibration</b>	11-Jan-19

**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)
7.0	6.9	-0.1
15.7	16.0	0.4
24.7	24.5	-0.2
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	3.99	3.98	-0.01
7.0	7.01	7.08	0.07
10.0	10.02	10.06	0.04
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	12.6	12.6	-0.55
0.2000	23.6	23.6	-0.08
0.5000	55.1	55.7	1.09
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)
6.97	6.92	-0.05
5.15	5.10	-0.05
3.97	4.08	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 -