



## 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

- 1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- 2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- 3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure 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 Jian Min/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

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### 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	
	C	Pass	0.8	2.1
	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	
Linearity range for SPL	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
	Frequency weightings			
Frequency weightings	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	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:

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.: 16CA1117 01-02

Page: 1 of 2

### Item tested

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

### Item submitted by

Customer: Lam Geotechnics Ltd.  
Address of Customer: -  
Request No.: -  
Date of receipt: 17-Nov-2016

Date of test: 18-Nov-2016

### Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2412857	14-Apr-2017	SCL
Preamplifier	B&K 2673	2239857	28-Apr-2017	CEPREI
Measuring amplifier	B&K 2610	2346941	26-Apr-2017	CEPREI
Signal generator	DS 360	61227	18-Apr-2017	CEPREI
Digital multi-meter	34401A	US36087050	18-Apr-2017	CEPREI
Audio analyzer	8903B	GB41300350	19-Apr-2017	CEPREI
Universal counter	53132A	MY40003662	19-Apr-2017	CEPREI

### Ambient conditions

Temperature:  $23 \pm 1$  °C  
Relative humidity:  $50 \pm 10$  %  
Air pressure:  $1005 \pm 5$  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 Jian Min/Feng Jun Qi

Date: 21-Nov-2016

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.: 16CA1117 01-02 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	Estimated Expanded Uncertainty dB
1000	94.00	94.12	0.10

(Output level in dB re 20 µPa)

**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 = 0.002 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 = 991.6 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 = 0.6 %

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.

- End -

Calibrated by: _____ <span style="margin-left: 100px;">Fung Chi Yip</span> Date: 18-Nov-2016	Checked by: _____ <span style="margin-left: 100px;">Lam Tze Wai</span> Date: 21-Nov-2016
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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 2016009653

Customer:

<b>Model Number</b>	CAL200	<b>Procedure Number</b>	D0001.8386
<b>Serial Number</b>	13437	<b>Technician</b>	Scott Montgomery
<b>Test Results</b>	<b>Pass</b>	<b>Calibration Date</b>	2 Nov 2016
<b>Initial Condition</b>	As Manufactured	<b>Calibration Due</b>	
<b>Description</b>	Larson Davis CAL200 Acoustic Calibrator	<b>Temperature</b>	25 °C ± 0.3 °C
		<b>Humidity</b>	28 %RH ± 3 %RH
		<b>Static Pressure</b>	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 60942:2003 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	09/07/2016	09/07/2017	001021
Sound Level Meter / Real Time Analyzer	04/07/2016	04/07/2017	001051
Microphone Calibration System	08/17/2016	08/17/2017	005446
1/2" Preamplifier	10/06/2016	10/06/2017	006506
Larson Davis 1/2" Preamplifier 7-pin LEMO	08/22/2016	08/22/2017	006507
1/2 inch Microphone - RI - 200V	03/15/2016	03/15/2017	006510
Pressure Transducer	07/01/2016	07/01/2017	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

Information supplied by customer:

CONTACT: MR. SAM LAM WORK ORDER: HK1710557
CLIENT: LAM GEOTECHNICS LIMITED
DATE RECEIVED: 11/07/2017
DATE OF ISSUE: 18/07/2017
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.

Table with 2 columns: Test Parameter, Value. Rows include Scope of Test (Turbidity), Equipment Type (Turbidimeter), Brand Name (Xin Rui), Model No. (WGZ-3B), Serial No. (1403009), Equipment No. (---), Date of Calibration (17/07/2017).

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: 18/07/2017

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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:** HK1710557  
**DATE OF ISSUE:** 18/07/2017  
**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>	17/07/2017
<b>Date of next Calibration:</b>	17/10/2017

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

Expected Reading (NTU)	Display Reading (NTU)	Tolerance
0	0.00	---
4	3.88	-3.0%
10	9.81	-1.9%
40	39.2	-2.1%
100	101	1.1%
400	400	0.0%
1000	1000	0.0%
	Tolerance Limit ( $\pm$ )	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:** HK1710600  
**CLIENT:** LAM GEOTECHNICS LIMITED  
**DATE RECEIVED:** 28/07/2017  
**DATE OF ISSUE:** 31/07/2017  
**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>	Turbidimeter
<b>Brand Name:</b>	Xin Rui
<b>Model No.:</b>	WGZ-3B
<b>Serial No.:</b>	1309192
<b>Equipment No.:</b>	---
<b>Date of Calibration:</b>	31/07/2017

**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: \_\_\_\_\_

31/07/2017

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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:** HK1710600  
**DATE OF ISSUE:** 31/07/2017  
**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>	1309192
<b>Equipment No.:</b>	---
<b>Date of Calibration:</b>	31/07/2017
<b>Date of next Calibration:</b>	31/10/2017

**Parameters:**  
**Turbidity**

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

Expected Reading (NTU)	Display Reading (NTU)	Tolerance
0	0.00	---
4	4.00	0.0%
10	9.92	-0.8%
40	40.6	1.5%
100	97.8	-2.2%
400	425	6.3%
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: HK1710434
CLIENT: LAM GEOTECHNICS LIMITED
DATE RECEIVED: 02/06/2017
DATE OF ISSUE: 06/06/2017
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.

Table with 2 columns: Test Parameter and Value. Rows include Scope of Test (Turbidity), Equipment Type (Turbidimeter), Brand Name (Xin Rui), Model No. (WGZ-3B), Serial No. (1512036), Equipment No. (---), and Date of Calibration (05/06/2017).

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: [Signature] Ms. Wong Po Yan, Pauline Assistant Laboratory Manager

Issue Date: 06/06/2017

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**REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION**

**WORK ORDER:** HK1710434  
**DATE OF ISSUE:** 06/06/2017  
**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>	1512036
<b>Equipment No.:</b>	---
<b>Date of Calibration:</b>	05/06/2017
<b>Date of next Calibration:</b>	05/09/2017

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

Expected Reading (NTU)	Display Reading (NTU)	Tolerance
0	0.00	---
4	4.01	0.2%
10	9.87	-1.3%
40	39.4	-1.5%
100	101	0.6%
400	400	0.0%
1000	1000	0.0%
	Tolerance Limit ( $\pm$ )	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.** : HK1710303  
**Project Name** : EQUIPMENT PERFORMANCE CHECK/CALIBRATION REPORT  
**Date of Issue** : 08/05/2017

**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.** : HK1710303  
**Test Item No.** : HK1710303-01  
**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** : 26/04/2017  
**Test Item Calibration Date** : 08/05/2017

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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  
(Testing Engineer)

Issue Date:

08/05/2017




**REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION**

**WORK ORDER:** HK1710303  
**DATE OF ISSUE:** 08/05/2017  
**CLIENT:** LAM ENVIRONMENTAL SERVICES LIMITED

<b>Equipment Type</b>	Sonde
<b>Manufacturer</b>	YSI
<b>Model No.</b>	Professional Plus
<b>Serial No.</b>	14E100105
<b>Date of Calibration</b>	08-May-17
<b>Date of next Calibration</b>	08-Aug-17

**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)
5.0	5.1	0.1
14.2	14.1	-0.1
23.8	23.4	-0.4
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	3.88	3.84	-0.04
7.0	6.95	6.88	-0.07
10.0	9.91	9.94	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	13.3	13.2	-0.75
0.2000	24.3	23.9	-1.65
0.5000	57.3	56.5	-1.40
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)
7.95	8.10	0.15
6.30	6.25	-0.05
5.61	5.53	-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 (accordng to APHA 19e 2510) is used to determine salinity.

- End of Report -



## EQUIPMENT PERFORMANCE CHECK / CALIBRATION REPORT

**Report No.** : HK1710621  
**Project Name** : EQUIPMENT PERFORMANCE CHECK/CALIBRATION REPORT  
**Date of Issue** : 04/08/2017  
  
**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.** : HK1710621  
**Test Item No.** : HK1710621-01  
**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** : 02/08/2017  
**Test Item Calibration Date** : 03/08/2017

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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 :

Issue Date:

04/08/2017

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




**REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION**

**WORK ORDER:** HK1710621  
**DATE OF ISSUE:** 04/08/2017  
**CLIENT:** LAM ENVIRONMENTAL SERVICES LIMITED

<b>Equipment Type</b>	Sonde
<b>Manufacturer</b>	YSI
<b>Model No.</b>	Professional Plus
<b>Serial No.</b>	14E100105
<b>Date of Calibration</b>	03-Aug-17
<b>Date of next Calibration</b>	03-Nov-17

**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)
6.5	6.4	-0.1
15.6	15.5	-0.1
26.0	25.6	-0.4
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	3.88	3.77	-0.11
7.0	6.90	6.98	0.08
10.0	9.86	9.81	-0.05
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	12.0	11.9	-0.83
0.2000	24.1	23.8	-1.24
0.5000	54.7	53.8	-1.65
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)
9.00	8.89	-0.11
6.62	6.71	0.09
4.64	4.55	-0.09
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 (accoridng to APHA 19e 2510) is used to determine salinity.

- End of Report -



## EQUIPMENT PERFORMANCE CHECK / CALIBRATION REPORT

**Report No.** : HK1710484  
**Project Name** : EQUIPMENT PERFORMANCE CHECK/CALIBRATION REPORT  
**Date of Issue** : 16/06/2017  
  
**Customer** : LAM GEOTECHNICS LIMITED  
**Address** : 11/F., CENTRE POINT, 181-185 GLOUCESTER ROAD, WAN CHAI, HONG KONG  


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**Calibration Job No.** : HK1710484  
**Test Item No.** : HK1710484-01  
**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** : 15/06/2017  
**Test Item Calibration Date** : 15/06/2017  


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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:

16/06/2017


**REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION**

**WORK ORDER:** HK1710484  
**DATE OF ISSUE:** 16/06/2017  
**CLIENT:** LAM GEOTECHNICS 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>	15-Jun-17
<b>Date of next Calibration</b>	15-Sep-17

**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)
4.4	4.6	0.2
15.8	15.8	0.0
24.3	24.2	-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	4.09	3.97	-0.12
7.0	7.06	7.14	0.08
10.0	9.98	9.90	-0.08
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	12.50	12.40	-0.80
0.2000	23.00	22.60	-1.74
0.5000	58.20	57.30	-1.55
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)
7.78	7.77	-0.01
6.52	6.47	-0.05
5.73	5.61	-0.12
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 (accordng to APHA 19e 2510) is used to determine salinity.

- End of Report -





## EQUIPMENT PERFORMANCE CHECK / CALIBRATION REPORT

**Report No.** : HK1710517  
**Project Name** : EQUIPMENT PERFORMANCE CHECK/CALIBRATION REPORT  
**Date of Issue** : 04/07/2017  
  
**Customer** : LAM ENVIRONMENTAL SERVICE LIMITED  
**Address** : 11/F., CENTRE POINT, 181-185 GLOUCESTER ROAD, WAN CHAI, HONG KONG  


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**Calibration Job No.** : HK1710517  
**Test Item No.** : HK1710517-01  
**Test Item Details**  
**Test Item Description** : Sonde  
**Manufacturer** : YSI  
**Model No.** : Professional Plus  
**Serial No.** : 17E100236  
**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** : 29/06/2017  
**Test Item Calibration Date** : 29/06/2017  


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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:

04/07/2017


**REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION**

**WORK ORDER:** HK1710517  
**DATE OF ISSUE:** 04/07/2017  
**CLIENT:** LAM ENVIRONMENTAL SERVICE LIMITED

<b>Equipment Type</b>	Sonde
<b>Manufacturer</b>	YSI
<b>Model No.</b>	Professional Plus
<b>Serial No.</b>	17E100236
<b>Date of Calibration</b>	29-Jun-17
<b>Date of next Calibration</b>	29-Sep-17

**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)
6.9	6.8	-0.1
13.4	13.3	-0.1
25.4	25.6	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	4.00	3.97	-0.03
7.0	6.98	7.07	0.09
10.0	9.94	9.96	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	13.00	12.90	-0.77
0.2000	24.60	24.20	-1.63
0.5000	57.40	56.80	-1.05
	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)
7.59	7.43	-0.16
5.36	5.46	0.10
4.48	4.52	0.04
	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 -



## Certificate for a Qualified Odour Panellist

This is to certify that

CHAN KAI WING

has participated in Ten (10) sets of individual N-Butanol Screening Test  
during 23 June 2017 – 29 June 2017

**with Individual Threshold: 46 ppb/v**

and

fulfill the Requirement of the European Standard Method of Air Quality -  
Determination of Odour Concentration by Dynamic Olfactometry (EN13725:2003) -

The Requirement of the Odour Threshold of n-Butanol in Nitrogen Gas in the Range of 20 – 80 ppb/v  
with at least 10 sets of individual threshold estimates and standard deviation less than 2.3

29 June 2017  
Issue Date

29 June 2018  
Valid Until

  
Fung Lim Chee, Richard





## Certificate for a Qualified Odour Panellist For Field Odour Patrol

This is to certify that

CHAN KAI WING

Participated in a set of n-Butanol Screening Tests in ALS Technichem (HK) Pty Ltd between  
23 June 2017 to 29 June 2017

and

fulfill the Requirement of the Odour Threshold of n-Butanol in Nitrogen Gas in the Range of 20 – 80  
ppb/v with Standard Deviation less than 2.3  
of the European Standard Method of Air Quality –

Determination of Odour Concentration by Dynamic Olfactometry (EN13725)

and

Trained with Reference to ASTM Standard Practices for Referencing Suprathreshold Odor Intensity  
(ASTM E544) for Hong Kong Four Point Scale at

29 June 2017

29 June 2017

Issue Date

29 September 2017

Valid Until

Fung Lim Chee, Richard



## Certificate for a Qualified Odour Panellist

This is to certify that

LAU SIU HANG

has participated in Ten (10) sets of individual N-Butanol Screening Test  
during 23 June 2017 – 29 June 2017

**with Individual Threshold: 42 ppb/v**

and

fulfill the Requirement of the European Standard Method of Air Quality -  
Determination of Odour Concentration by Dynamic Olfactometry (EN13725:2003) –

The Requirement of the Odour Threshold of n-Butanol in Nitrogen Gas in the Range of 20 – 80 ppb/v  
with at least 10 sets of individual threshold estimates and standard deviation less than 2.3

29 June 2017  
Issue Date

29 June 2018  
Valid Until

  
Fung Lim Chee, Richard





## Certificate for a Qualified Odour Panellist For Field Odour Patrol

This is to certify that

LAU SIU HANG

Participated in a set of n-Butanol Screening Tests in ALS Technichem (HK) Pty Ltd between  
23 June 2017 to 29 June 2017

and

fulfill the Requirement of the Odour Threshold of n-Butanol in Nitrogen Gas in the Range of 20 - 80  
ppb/v with Standard Deviation less than 2.3  
of the European Standard Method of Air Quality -  
Determination of Odour Concentration by Dynamic Olfactometry (EN13725)

and

Trained with Reference to ASTM Standard Practices for Referencing Suprathreshold Odor Intensity  
(ASTM E544) for Hong Kong Four Point Scale at

29 June 2017

29 June 2017  
Issue Date

29 September 2017  
Valid Until

  
Fung Lim Chee, Richard





## Certificate for a Qualified Odour Panellist

This is to certify that

CHOW WING TUNG, SHEILA

has participated in Ten (10) sets of individual N-Butanol Screening Test  
during 23 June 2017 – 29 June 2017

**with Individual Threshold: 43 ppb/v**

and

fulfill the Requirement of the European Standard Method of Air Quality -  
Determination of Odour Concentration by Dynamic Olfactometry (EN13725:2003) -

The Requirement of the Odour Threshold of n-Butanol in Nitrogen Gas in the Range of 20 – 80 ppb/v  
with at least 10 sets of individual threshold estimates and standard deviation less than 2.3

29 June 2017  
Issue Date

29 June 2018  
Valid Until

  
Fung Lim Chee, Richard



## Certificate for a Qualified Odour Panellist For Field Odour Patrol

This is to certify that

CHOW WING TUNG, SHEILA

Participated in a set of n-Butanol Screening Tests in ALS Technichem (HK) Pty Ltd between  
23 June 2017 to 29 June 2017

and

fulfill the Requirement of the Odour Threshold of n-Butanol in Nitrogen Gas in the Range of 20 – 80  
ppb/v with Standard Deviation less than 2.3  
of the European Standard Method of Air Quality –

Determination of Odour Concentration by Dynamic Olfactometry (EN13725)

and

Trained with Reference to ASTM Standard Practices for Referencing Suprathreshold Odor Intensity  
(ASTM E544) for Hong Kong Four Point Scale at

29 June 2017

29 June 2017

Issue Date

29 September 2017

Valid Until

  
Fung Lim Chee, Richard





TISCH ENVIRONMENTAL, INC.  
 145 SOUTH MIAMI AVE  
 VILLAGE OF CLEVELAND, OH  
 45002  
 513.467.9000  
 877.263.7610 TOLL FREE  
 513.467.9009 FAX

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - May 20, 2016 Rootsmeter S/N 0438320 Ta (K) - 293  
 Operator Tisch Orifice I.D. - 3166 Pa (mm) - 748.03

PLATE OR Run #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER	ORFICE
					DIFF Hg (mm)	DIFF H2O (in.)
1	NA	NA	1.00	1.4270	3.2	2.00
2	NA	NA	1.00	1.0220	6.4	4.00
3	NA	NA	1.00	0.9100	7.9	5.00
4	NA	NA	1.00	0.8730	8.8	5.50
5	NA	NA	1.00	0.7180	12.7	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	Va	(x axis) Qa	(y axis)
0.9967	0.6985	1.4150	0.9957	0.6977	0.8851
0.9925	0.9711	2.0010	0.9915	0.9701	1.2517
0.9904	1.0883	2.2372	0.9893	1.0872	1.3995
0.9892	1.1332	2.3464	0.9882	1.1320	1.4678
0.9840	1.3705	2.8299	0.9830	1.3691	1.7702
Qstd slope (m) = 2.10714			Qa slope (m) = 1.31946		
intercept (b) = -0.05158			intercept (b) = -0.03226		
coefficient (r) = 0.99978			coefficient (r) = 0.99978		
y axis = SQRT[H2O(Pa/760)(298/Ta)]			y axis = SQRT[H2O(Ta/Pa)]		

CALCULATIONS

$$Vstd = \text{Diff. Vol} [(Pa - \text{Diff. Hg}) / 760] (298 / Ta)$$

$$Qstd = Vstd / \text{Time}$$

$$Va = \text{Diff Vol} [(Pa - \text{Diff Hg}) / Pa]$$

$$Qa = Va / \text{Time}$$

For subsequent flow rate calculations:

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

$$Qa = 1/m \{ [\text{SQRT}(\text{H2O}(\text{Ta}/\text{Pa}))] - b \}$$





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

Location : CMA1b Calibration Date : 07-Jun-17  
 Equipment no. : HVS001 Calibration Due Date : 07-Aug-17

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, $T_a$	293	Kelvin	Pressure, $P_a$
			1010 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			$Q_{std}$ ( $m^3 / \text{min.}$ ) 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	0.8788	28	28.1919
2	2.3	2.3	4.6	1.0840	36	36.2467
3	3.7	3.7	7.4	1.3701	46	46.3152
4	4.7	4.7	9.4	1.5419	52	52.3563
5	5.9	5.9	11.8	1.7254	60	60.4112

By Linear Regression of Y on X

Slope, m = 37.3597 Intercept, b = -4.6120  
 Correlation Coefficient\* = 0.9993  
 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 Checked by : Pauline Wong  
 Date : 07-Jun-17 Date : 07-Jun-17



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

Location : CMA1b  
 Equipment no. : HVS001

Calibration Date : 02-Aug-17  
 Calibration Due Date : 02-Oct-17

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T <sub>a</sub>	300	Kelvin	Pressure, P <sub>a</sub>
			1002 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori001	Slope, m <sub>c</sub>	2.02533	Intercept, b <sub>c</sub>	-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 <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	0.8653	26	25.7683
2	2.3	2.3	4.6	1.0673	35	34.6881
3	3.8	3.8	7.6	1.3668	45	44.5990
4	4.8	4.8	9.6	1.5339	52	51.5366
5	6.0	6.0	12.0	1.7129	59	58.4742

By Linear Regression of Y on X

Slope, m = 37.9321                      Intercept, b = -6.6488  
 Correlation Coefficient\* = 0.9991  
 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 : 02-Aug-17

Checked by : Pauline Wong  
 Date : 02-Aug-17



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

**Location** : CMA2a **Calibration Date** : 07-Jun-17  
**Equipment no.** : HVS002 **Calibration Due Date** : 07-Aug-17

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, $T_a$	303	Kelvin	Pressure, $P_a$
			1010 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			$Q_{std}$ ( $m^3 / \text{min.}$ ) 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	0.8645	30	29.7030
2	2.5	2.5	5.0	1.1109	39	38.6138
3	4.0	4.0	8.0	1.4004	47	46.5346
4	5.2	5.2	10.4	1.5943	53	52.4752
5	6.4	6.4	12.8	1.7667	60	59.4059

By Linear Regression of Y on X

Slope,  $m$  = 31.8963 Intercept,  $b$  = 2.3711  
 Correlation Coefficient\* = 0.9982  
 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 **Checked by** : Pualine Wong  
**Date** : 07-Jun-17 **Date** : 07-Jun-17





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

Location : CMA2a Calibration Date : 02-Aug-17  
 Equipment no. : HVS002 Calibration Due Date : 02-Oct-17

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, $T_a$	300	Kelvin	Pressure, $P_a$
			1002 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			$Q_{std}$ ( $m^3 / \text{min.}$ ) 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	0.8653	28	27.7505
2	2.5	2.5	5.0	1.1120	34	33.6970
3	4.0	4.0	8.0	1.4018	42	41.6257
4	5.1	5.1	10.2	1.5806	49	48.5633
5	6.3	6.3	12.6	1.7547	55	54.5099

By Linear Regression of Y on X

Slope, m = 30.1617 Intercept, b = 0.7255  
 Correlation Coefficient\* = 0.9959  
 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 Checked by : Pualine Wong  
 Date : 02-Aug-17 Date : 02-Aug-17



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

Location : CMA3a Calibration Date : 16-Jun-17  
 Equipment no. : HVS012 Calibration Due Date : 16-Aug-17

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T <sub>a</sub>	302	Kelvin	Pressure, P <sub>a</sub>
			1005 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori001	Slope, m <sub>c</sub>	2.02533	Intercept, b <sub>c</sub>	-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 <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	1.3	1.3	2.6	0.8053	34	33.6355
2	2.2	2.2	4.4	1.0423	40	39.5711
3	3.4	3.4	6.8	1.2915	46	45.5068
4	4.5	4.5	9.0	1.4831	51	50.4532
5	5.7	5.7	11.4	1.6669	55	54.4103

By Linear Regression of Y on X

Slope, m = 24.2490 Intercept, b = 14.2141  
 Correlation Coefficient\* = 0.9997  
 Calibration Accepted = Yes/Ne\*\*

\* 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 Checked by : Pauline Wong  
 Date : 16-Jun-17 Date : 16-Jun-17



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

Location : CMA3a  
 Equipment no. : HVS012

Calibration Date : 07-Aug-17  
 Calibration Due Date : 07-Oct-17

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T <sub>a</sub>	304	Kelvin	Pressure, P <sub>a</sub>
			1006 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori001	Slope, m <sub>c</sub>	2.02533	Intercept, b <sub>c</sub>	-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 <sub>std</sub> (m <sup>3</sup> / min.)  X-axis	Continuous Flow Recorder, W (CFM)	IC   Y-axis
	H (inches of water)					
	(up)	(down)	(difference)			$(W(P_a/1013.3 \times 298/T_a)^{1/2}/35.31)$
1	1.3	1.3	2.6	0.8031	33	32.5548
2	2.0	2.0	4.0	0.9919	39	38.4739
3	3.2	3.2	6.4	1.2500	45	44.3929
4	4.4	4.4	8.8	1.4627	50	49.3255
5	5.9	5.9	11.8	1.6909	54	53.2715

By Linear Regression of Y on X

Slope, m = 23.2303      Intercept, b = 14.8045  
 Correlation Coefficient\* = 0.9955  
 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 : 07-Aug-17

Checked by : Pauline Wong  
 Date : 07-Aug-17





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

Location : CMA4a Calibration Date : 16-Jun-17  
 Equipment no. : HVS004 Calibration Due Date : 16-Aug-17

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition				
Temperature, T <sub>a</sub>	302	Kelvin	Pressure, P <sub>a</sub>	1005 mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori001	Slope, m <sub>c</sub>	2.02533	Intercept, b <sub>c</sub>	-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 <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	1.4	1.4	2.8	0.8351	24	23.7427
2	2.3	2.3	4.6	1.0654	33	32.6462
3	3.4	3.4	6.8	1.2915	42	41.5497
4	4.5	4.5	9.0	1.4831	48	47.4854
5	5.6	5.6	11.2	1.6524	52	51.4425

By Linear Regression of Y on X

Slope, m = 34.4301 Intercept, b = -4.1975  
 Correlation Coefficient\* = 0.9958  
 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 : 16-Jun-17 Date : 16-Jun-17



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

Location : CMA4a  
 Equipment no. : HVS004

Calibration Date : 07-Aug-17  
 Calibration Due Date : 07-Oct-17

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, $T_a$	304	Kelvin	Pressure, $P_a$
			1006 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			$Q_{std}$ ( $m^3 / min.$ ) <b>X-axis</b>	Continuous Flow Recorder, $W$ (CFM)	IC ( $W(P_a/1013.3 \times 298/T_a)^{1/2}/35.31$ ) <b>Y-axis</b>
	(up)	(down)	(difference)			
1	1.4	1.4	2.8	0.8328	23	22.6897
2	2.4	2.4	4.8	1.0849	30	29.5953
3	3.7	3.7	7.4	1.3428	40	39.4604
4	4.7	4.7	9.4	1.5111	47	46.3660
5	5.8	5.8	11.6	1.6767	52	51.2985

By Linear Regression of Y on X

Slope,  $m$  = 34.9158      Intercept,  $b$  = -7.1472  
 Correlation Coefficient\* = 0.9977  
 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 : 07-Aug-17

Date : 07-Aug-17



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

Location : CMA5b  
 Equipment no. : HVS010

Calibration Date : 16-Jun-17  
 Calibration Due Date : 16-Aug-17

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, $T_a$	302	Kelvin	Pressure, $P_a$
			1005 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 ( $W(P_a/1013.3 \times 298/T_a)^{1/2}/35.31$ ) Y-axis
	(up)	(down)	(difference)			
1	1.4	1.4	2.8	0.8351	36	35.6140
2	2.2	2.2	4.4	1.0423	42	41.5497
3	3.5	3.5	7.0	1.3101	50	49.4639
4	4.5	4.5	9.0	1.4831	56	55.3996
5	5.6	5.6	11.2	1.6524	61	60.3460

By Linear Regression of Y on X

Slope, m = 30.4653      Intercept, b = 9.9483  
 Correlation Coefficient\* = 0.9996  
 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 : 16-Jun-17

Checked by : Pauline Wong  
 Date : 16-Jun-17





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

Location : CMA5b  
 Equipment no. : HVS010

Calibration Date : 07-Aug-17  
 Calibration Due Date : 07-Oct-17

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, $T_a$	304	Kelvin	Pressure, $P_a$
			1006 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 ( $W(P_a/1013.3 \times 298/T_a)^{1/2}/35.31$ )  Y-axis
	(up)	(down)	(difference)			
1	1.4	1.4	2.8	0.8328	33	32.5548
2	2.3	2.3	4.6	1.0624	40	39.4604
3	3.6	3.6	7.2	1.3247	48	47.3525
4	4.7	4.7	9.4	1.5111	54	53.2715
5	5.8	5.8	11.6	1.6767	58	57.2176

By Linear Regression of Y on X

Slope, m = 29.6169                      Intercept, b = 8.0158  
 Correlation Coefficient\* = 0.9994  
 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 : 07-Aug-17

Checked by : Pauline Wong  
 Date : 07-Aug-17



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

Location : CMA6a  
 Equipment no. : HVS013

Calibration Date : 16-Jun-17  
 Calibration Due Date : 16-Aug-17

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, $T_a$	302	Kelvin	Pressure, $P_a$
			1005 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-May-17		

Calibration of TSP						
Calibration Point	Manometer Reading			$Q_{std}$ ( $m^3 / min.$ )	Continuous Flow Recorder, W (CFM)	IC ( $W(P_a/1013.3 \times 298/T_a)^{1/2}/35.31$ )
	H (inches of water)					
	(up)	(down)	(difference)			
1	1.5	1.5	3.0	0.8638	32	31.6569
2	2.4	2.4	4.8	1.0879	39	38.5819
3	3.6	3.6	7.2	1.3284	46	45.5068
4	4.7	4.7	9.4	1.5153	54	53.4211
5	6.0	6.0	12.0	1.7098	60	59.3567

By Linear Regression of Y on X

Slope, m = 33.0592      Intercept, b = 2.6936  
 Correlation Coefficient\* = 0.9982  
 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 : 16-Jun-17

Checked by : Pauline Wong  
 Date : 16-Jun-17



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

Location : CMA6a  
 Equipment no. : HVS013

Calibration Date : 07-Aug-17  
 Calibration Due Date : 07-Oct-17

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, $T_a$	304	Kelvin	Pressure, $P_a$
			1006 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-May-17				

Calibration of TSP						
Calibration Point	Manometer Reading			$Q_{std}$ ( $m^3 / min.$ )	Continuous Flow Recorder, W (CFM)	IC ( $W(P_a/1013.3 \times 298/T_a)^{1/2}/35.31$ )
	H (inches of water)					
	(up)	(down)	(difference)			
1	1.5	1.5	3.0	0.8614	33	32.5548
2	2.4	2.4	4.8	1.0849	41	40.4469
3	3.7	3.7	7.4	1.3428	50	49.3255
4	4.8	4.8	9.6	1.5269	56	55.2445
5	6.1	6.1	12.2	1.7191	62	61.1636

By Linear Regression of Y on X

Slope, m = 33.4343      Intercept, b = 4.0483  
 Correlation Coefficient\* = 0.9996  
 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 : 07-Aug-17

Checked by : Pauline Wong  
 Date : 07-Aug-17