# Calibration Certificate

Certificate Number 2020014198

Customer:

Lam Geotechnics Ltd

Model NumberLxT SEProcedure NumberD0001.8384Serial Number0006307TechnicianRon HarrisTest ResultsPassCalibration Date28 Dec 2020

Initial Condition As Manufactured Calibration Due

Temperature 23.25 °C  $\pm$  0.25 °C Description Sound Expert LxT Humidity 51.6 %RH  $\pm$  2.0 %RH

Static Pressure

Class 1 Sound Level Meter Firmware Revision: 2.404

Evaluation Method Tested with: Data reported in dB re 20 μPa.

Larson Davis PRMLxT1L. S/N 070008

PCB 377B02. S/N 325638 Larson Davis CAL200. S/N 9079 Larson Davis CAL291. S/N 0108

**Compliance Standards** Compliant to Manufacturer Specifications and the following standards when combined with

Calibration Certificate from procedure D0001.8378:

IEC 60651:2001 Type 1 ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1 ANSI S1.4 (R2006) Type 1
IEC 61252:2002 ANSI S1.11 (R2009) Class 1

IEC 61260:2001 Class 1 ANSI S1.25 (R2007)

IEC 61672:2013 Class 1 ANSI S1.43 (R2007) Type 1

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 International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017.

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 9001:2015.

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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Correction data from Larson Davis LxT Manual for SoundTrack LxT & SoundExpert Lxt, I770.01 Rev J Supporting Firmware Version 2.301, 2015-04-30

LARSON DAVIS - A PCB PIEZOTRONICS DIV. 1681 West 820 North Provo,UT 84601,United States 716-684-0001

2020-12-28T13:05:57





85.71 kPa

± 0.13 kPa

#### Certificate Number 2020014198

For 1/4" microphones, the Larson Davis ADP024 1/4" to 1/2" adaptor is used with the calibrators and the Larson Davis ADP043 1/4" to 1/2" adaptor is used with the preamplifier.

Calibration Check Frequency: 1000 Hz; Reference Sound Pressure Level: 114 dB re 20 µPa

Periodic tests were performed in accordance with precedures from IEC 61672-3:2013 / ANSI/ASA S1.4-2014/Part3.

No Pattern approval for IEC 61672-1:2013 / ANSI/ASA S1.4-2014/Part 1 available.

The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3:2013 / ANSI/ASA S1.4-2014/Part 3, for the environmental conditions under which the tests were performed. However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 / ANSI/ASA S1.4-2014/Part 1 because (a) evidence was not publicly available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 / ANSI/ASA S1.4-2014/Part 1 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 / ANSI/ASA S1.4-2014/Part 3 cover only a limited subset of the specifications in IEC 61672-1:2013 / ANSI/ASA S1.4-2014/Part 1.

Standards Used					
Description	Cal Date	Cal Due	Cal Standard		
Larson Davis CAL291 Residual Intensity Calibrator	2020-09-18	2021-09-18	001250		
Hart Scientific 2626-S Humidity/Temperature Sensor	2020-05-12	2021-05-12	006943		
Larson Davis CAL200 Acoustic Calibrator	2020-07-21	2021-07-21	007027		
Larson Davis Model 831	2020-03-02	2021-03-02	007182		
PCB 377A13 1/2 inch Prepolarized Pressure Microphone	2020-03-05	2021-03-05	007185		
SRS DS360 Ultra Low Distortion Generator	2020-04-14	2021-04-14	007635		
Larson Davis 1/2" Preamplifier for Model 831 Type 1	2020-10-06	2021-10-06	PCB0004783		

#### **Acoustic Calibration**

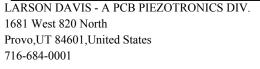
Measured according to IEC 61672-3:2013 10 and ANSI S1.4-2014 Part 3: 10

Measurement	Test Result [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result	
1000 Hz	114.01	113.80	114.20	0.14	Pass	

# **Loaded Circuit Sensitivity**

Measurement	Test Result [dB re 1 V / Pa]	Lower Limit [dB re 1 V / Pa]	Upper Limit [dB re 1 V / Pa]	Expanded Uncertainty [dB]	Result	
1000 Hz	-27.74	-29.61	-26.24	0.14	Pass	

-- End of measurement results--







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#### Certificate Number 2020014198

# **Acoustic Signal Tests, C-weighting**

Measured according to IEC 61672-3:2013 12 and ANSI S1.4-2014 Part 3: 12 using a comparison coupler with Unit Under Test (UUT) and reference SLM using slow time-weighted sound level for compliance to IEC 61672-1:2013 5.5; ANSI S1.4-2014 Part 1: 5.5

Frequency [Hz]	Test Result [dB]	Expected [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
125	-0.18	-0.20	-1.20	0.80	0.23	Pass
1000	0.16	0.00	-0.70	0.70	0.23	Pass
8000	-3.19	-3.00	-5.50	-1.50	0.32	Pass

<sup>--</sup> End of measurement results--

# **Self-generated Noise**

Measured according to IEC 61672-3:2013 11.1 and ANSI S1.4-2014 Part 3: 11.1

Measurement	Test Result [dB]	
A-weighted	40.20	

-- End of measurement results--

-- End of Report--

Signatory: Ron Harris

LARSON DAVIS - A PCB PIEZOTRONICS DIV. 1681 West 820 North Provo,UT 84601,United States 716-684-0001

2020-12-28T13:05:57







# 綜合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD.

香港新界葵涌永基路22-24號好爸爸創科大廈 Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com



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# CERTIFICATE OF CALIBRATION

Certificate No.:

20CA1119 02-01

Page:

of

Item tested

Description:

Acoustical Calibrator (Class 1)

Manufacturer: Type/Model No.: Larson Davis CAL200

Serial/Equipment No.:

13437

Adaptors used:

-

Item submitted by

Curstomer:

Lam Environmental Services Limited.

Address of Customer:

\_

Request No.: Date of receipt:

19-Nov-2020

Date of test:

20-Nov-2020

#### Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2341427	11-May-2021	SCL
Preamplifier	B&K 2673	2743150	03-Jun-2021	CEPREI
Measuring amplifier	B&K 2610	2346941	03-Jun-2021	CEPREI
Signal generator	DS 360	33873	19-May-2021	CEPREI
Digital multi-meter	34401A	US36087050	19-May-2021	CEPREI
Audio analyzer	8903B	GB41300350	18-May-2021	CEPREI
Universal counter	53132A	MY40003662	18-May-2021	CEPREI

# Ambient conditions

Temperature:

22 ± 1 °C

Relative humidity:

55 ± 10 %

Air pressure:

1005 ± 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.
- 2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.
- 3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

# Test results

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

Approved Signatory:

Date: 21-Nov-2020

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. The results apply to the item as received.

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Form No.CARP156-1/Issue 1/Rev.D/01/03/2007



# 綜 合 試 驗 有 限 公 司

港新界葵涌永基路22-24號好爸爸創科大廈 Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com



# CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

20CA1119 02-01

Page:

#### 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

	(Output level in dB re 20 μPa)
	Estimated Expanded
1	Uncertainty

Frequency Shown	Output Sound Pressure Level Setting	Measured Output Sound Pressure Level	Estimated Expanded Uncertainty
Hz	dB	dB	dB
1000	94.00	93.66	0.10

#### 2, Sound Pressure Level Stability - Short Term Fluctuations

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

At 1000 Hz

STF = 0.013 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 = 1000.1 Hz

Estimated expanded uncertainty

0.1 Hz

Coverage factor k = 2.2

#### **Total Noise and Distortion** 4,

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 = 0.5%

Estimated expanded uncertainty

0.7 %

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

Calibrated by:

End

Date:

Funa Chi Yip 20-Nov-2020 Checked by:

Date:

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.

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Form No.CARP156-2/Issue 1/Rev.C/01/05/2005



#### **Portable Dust Meter Performance Check Record**

#### Portable Dust Meter

Type : Particulare Monitor

Manufacturer : Metone AEROCET 831

Model Number : 831

Serial Number : Y23153

Performance Check Date : 29-Dec-20

**Standard Equipment** 

Type : High Volume Sampler

Manufacturer : TISCH

Model Number : TE-5170

Equipment Number : HVS000

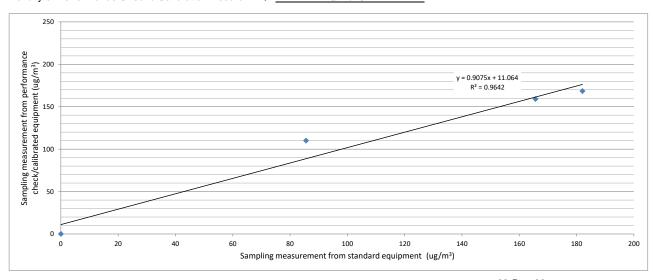
Last Calibration Date : 28-Dec-20

#### **Portable Dust Meter Performance Check Results**

				Concentration in ug/m <sup>3</sup>	Concentration in ug/m <sup>3</sup>
Trial no. in 1-hr period	Time	Mean Pressure (hPa)	Mean Temp (°C)	(Standard equipment)	(Performance Check / Calibrated equipment)
		, ,		(X - Axis)	(Y - Axis)
Zero Check	28/12/2020 08:00	0	0	0	0
1	29/12/2020 08:04	1015	21	182	168
2	29/12/2020 09:05	1015	21	166	159
3	29/12/2020 10:06	1015	21	86	110

<sup>\*</sup> Filter paper weighting was conducted by HOKLAS accredited laboratory

Linear Regression of Y on X



Operator:	Henry Lau	Date: _	29-Dec-20
Checked by:	James Chu	Date:	30-Dec-20



#### **Portable Dust Meter Performance Check Record**

#### Portable Dust Meter

Type : Particulare Monitor

Manufacturer : Metone AEROCET 831

Model Number : 831

Serial Number : Y23154

Performance Check Date : 29-Dec-20

Standard Equipment

Type : High Volume Sampler

Manufacturer : TISCH

Model Number : TE-5170

Equipment Number : HVS000

Last Calibration Date : 28-Dec-20

#### **Portable Dust Meter Performance Check Results**

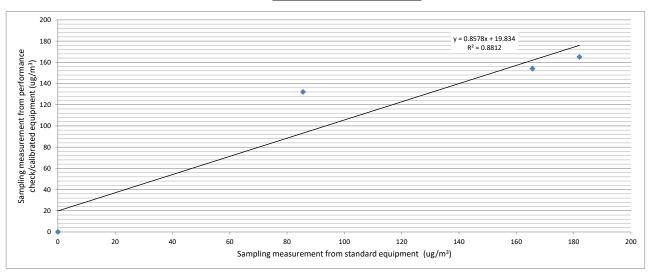
		., -		Concentration in ug/m <sup>3</sup>	•
Trial no. in 1-hr period	Time	Mean Pressure (hPa)	Mean Temp (°C)	(Standard equipment)	(Performance Check / Calibrated equipment)
				(X - Axis)	(Y - Axis)
Zero Check	28/12/2020 08:00	0	0	0	0
1	29/12/2020 08:04	1015	21	182	165
2	29/12/2020 09:05	1015	21	166	154
3	29/12/2020 10:06	1015	21	86	132

<sup>\*</sup> Filter paper weighting was conducted by HOKLAS accredited laboratory

Linear Regression of Y on X

Slope (K- factor) : 
Correlation Coefficient : 
Validity of Performance Check / Calibration Record :

: <u>1.1000</u> : <u>0.9387</u> : <u>29/12/2021</u>



Operator:	Henry Lau	Date:	29-Dec-20
Checked by:	James Chu	Date:	30-Dec-20



#### **Portable Dust Meter Performance Check Record**

#### Portable Dust Meter

уре	: <u></u>	Particulare Monitor

Manufacturer Metone AEROCET 831

**Model Number** 

**Serial Number** W16848

29-Dec-20 **Performance Check Date** 

Standard Equipment

High Volume Sampler Type

Manufacturer TISCH

**Model Number** TE-5170

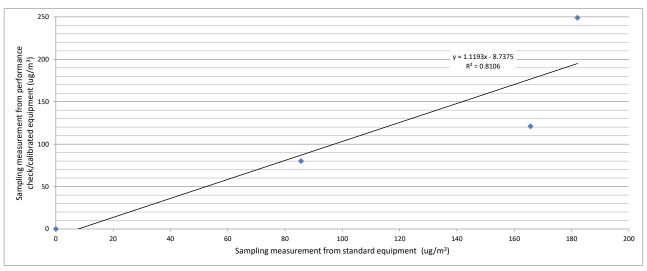
**Equipment Number** HVS000

**Last Calibration Date** 28-Dec-20

#### **Portable Dust Meter Performance Check Results**

				Concentration in ug/m <sup>3</sup>	Concentration in ug/m <sup>3</sup>
Trial no. in 1-hr period	Time	Mean Pressure (hPa)	Mean Temp (°C)	(Standard equipment)	(Performance Check / Calibrated equipment)
				(X - Axis)	(Y - Axis)
Zero Check	28/12/2020 08:00	0	0	0	0
1	29/12/2020 08:04	1015	21	182	249
2	29/12/2020 09:05	1015	21	166	121
3	29/12/2020 10:06	1015	21	86	80

Linear Regression of Y on X Slope (K- factor) Correlation Coefficient Validity of Performance Check / Calibration Record



Operator:	Henry Lau	Date:	29-Dec-20
Checked by:	James Chu	Date:	30-Dec-20



#### **Portable Dust Meter Performance Check Record**

# Portable Dust Meter

Туре	: _	Particulare Monitor
Manufacturer	: _	Metone AEROCET 831
Model Number	: _	831
Serial Number	: _	W15448

**Standard Equipment** 

**Performance Check Date** 

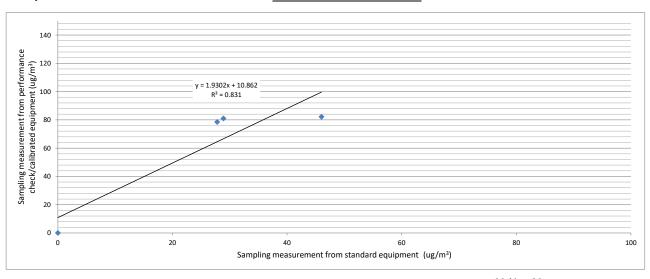
High Volume Sampler Type Manufacturer TISCH **Model Number** TE-5170 **Equipment Number** HVS018 **Last Calibration Date** 08-Sep-20

#### **Portable Dust Meter Performance Check Results**

				Concentration in ug/m <sup>3</sup>	Concentration in ug/m <sup>3</sup>
Trial no. in 1-hr period	Time	Mean Pressure (hPa)	Mean Temp (°C)	(Standard equipment)	(Performance Check / Calibrated equipment)
		, ,		(X - Axis)	(Y - Axis)
Zero Check	2/11/2020 08:00	1015	25	0	0
1	3/11/2020 08:24	1017	24	29	81
2	3/11/2020 09:25	1017	24	28	79
3	3/11/2020 10:26	1017	24	46	82

03-Nov-20

Linear Regression of Y on X Slope (K- factor) Correlation Coefficient Validity of Performance Check / Calibration Record



Operator:	Alan Ng	Date:	03-Nov-20
Checked by:	James Chu	Date:	04-Nov-20



#### **Portable Dust Meter Performance Check Record**

#### Portable Dust Meter

Гуре	:	Particulare Monitor

Manufacturer : Metone AEROCET 831

Model Number : BT-645

Serial Number : X19295

Performance Check Date : 20-Apr-21

Standard Equipment

Type : High Volume Sampler

Manufacturer : TISCH

Model Number : TE-5170

Equipment Number : HVS018

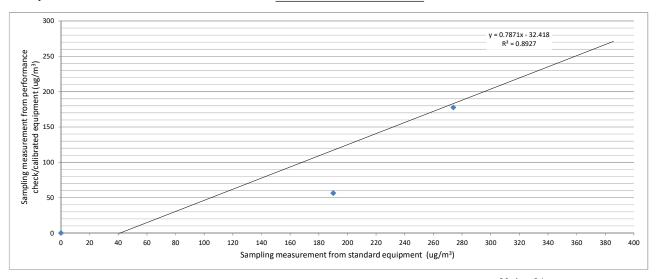
Last Calibration Date : 20-Apr-21

#### **Portable Dust Meter Performance Check Results**

				Concentration in ug/m <sup>3</sup>	Concentration in ug/m <sup>3</sup>
Trial no. in 1-hr period	Time	Mean Pressure (hPa)	Mean Temp (°C)	(Standard equipment)	(Performance Check / Calibrated equipment)
				(X - Axis)	(Y - Axis)
Zero Check	19/4/2021 08:00	0	0	0	0
1	20/4/2021 10:28	1013	23	190	56
2	20/4/2021 11:30	1013	23	386	305
3	20/4/2021 12:31	1013	23	274	178

<sup>\*</sup> Filter paper weighting was conducted by HOKLAS accredited laboratory

Linear Regression of Y on X



Operator:	Alan Ng	Date:	20-Apr-21
Checked by:	James Chu	Date:	21-Apr-21



#### **Portable Dust Meter Performance Check Record**

#### Portable Dust Meter

Type : Particulare Monitor

Manufacturer : Metone AEROCET 831

Model Number : BT-645

Serial Number : X19296

Performance Check Date : 16-Sep-20

**Standard Equipment** 

Type : High Volume Sampler

Manufacturer : TISCH

Model Number : TE-5170

Equipment Number : HVS000

Last Calibration Date : 17-Aug-20

#### **Portable Dust Meter Performance Check Results**

				Concentration in ug/m <sup>3</sup>	Concentration in ug/m <sup>3</sup>
Trial no. in 1-hr period	Time	Mean Pressure (hPa)	Mean Temp (°C)	(Standard equipment)	(Performance Check / Calibrated equipment)
·		, ,		(X - Axis)	(Y - Axis)
Zero Check	15/6/2020 08:00	1009	27	0	0
1	16/9/2020 11:42	1008	30	486	281
2	16/9/2020 12:43	1008	30	543	441
3	16/9/2020 13:44	1008	30	366	273

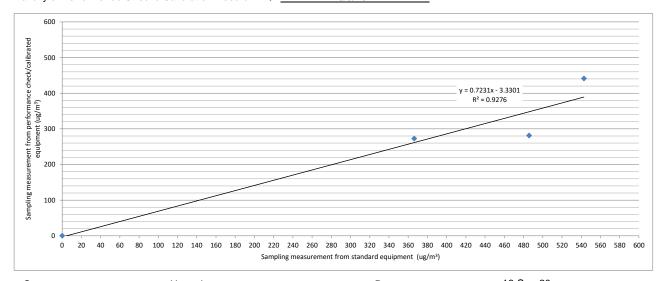
<sup>\*</sup> Filter paper weighting was conducted by HOKLAS accredited laboratory

Linear Regression of Y on X

 Slope (K- factor)
 : 1.3000

 Correlation Coefficient
 : 0.9631

 Validity of Performance Check / Calibration Record
 : 16/9/2021



Operator:	Henry Lau	Date:	16-Sep-20	
Checked by:	James Chu	Date:	17-Sep-20	



#### **Portable Dust Meter Performance Check Record**

#### Portable Dust Meter

<sup>-</sup> уре	:	Particulare Monitor

Manufacturer : Metone AEROCET 831

Model Number : BT-645

Serial Number : X19297

Performance Check Date : 20-Apr-21

Standard Equipment

Type : High Volume Sampler

Manufacturer : TISCH

Model Number : TE-5170

Equipment Number : HVS018

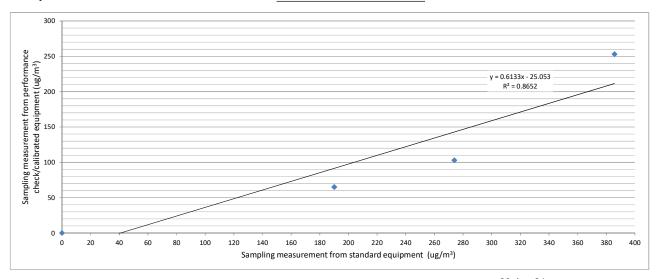
Last Calibration Date : 20-Apr-21

#### **Portable Dust Meter Performance Check Results**

Trial nation 4 has		Maria Diagram		Concentration in ug/m <sup>3</sup>	Concentration in ug/m³
Trial no. in 1-hr period	Time	Mean Pressure (hPa)	Mean Temp (°C)	(Standard equipment)	(Performance Check / Calibrated equipment)
				(X - Axis)	(Y - Axis)
Zero Check	19/4/2021 08:00	0	0	0	0
1	20/4/2021 10:17	1013	23	190	65
2	20/4/2021 11:18	1013	23	386	253
3	20/4/2021 12:19	1013	23	274	103

<sup>\*</sup> Filter paper weighting was conducted by HOKLAS accredited laboratory

Linear Regression of Y on X



Operator:	Alan Ng	Date:	20-Apr-21
Checked by:	James Chu	Date:	21-Apr-21



#### **Portable Dust Meter Performance Check Record**

# Portable Dust Meter

Гуре	: .	Particulare Monitor
<b>Manufacturer</b>	:	Metone AEROCET 831
	-	
Model Number	:	BT-645

**Serial Number** X19298

**Performance Check Date** 22-Mar-21

Standard Equipment

High Volume Sampler Type

Manufacturer TISCH

**Model Number** TE-5170

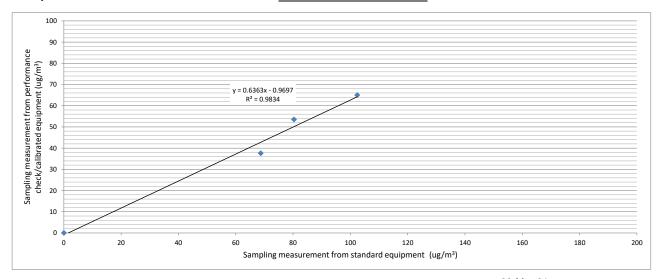
**Equipment Number** HVS018

**Last Calibration Date** 08-Mar-21

#### **Portable Dust Meter Performance Check Results**

Trial no. in 1-hr	Ŧ	Mean Pressure	M - T - (*0)	Concentration in ug/m <sup>3</sup>	Concentration in ug/m <sup>3</sup> (Performance Check /
period	Time	(hPa)	Mean Temp (°C)	(Standard equipment)	Calibrated equipment)
				(X - Axis)	(Y - Axis)
Zero Check	28/12/2020 08:00	0	0	0	0
1	22/3/2021 08:00	1015	21	102	65
2	22/3/2021 09:01	1015	21	80	54
3	22/3/2021 10:01	1015	21	69	38

Linear Regression of Y on X Slope (K- factor) Correlation Coefficient Validity of Performance Check / Calibration Record



Operator:	Alan Ng	Date:	22-Mar-21
Checked by:	James Chu	Date:	23-Mar-21



#### **Portable Dust Meter Performance Check Record**

#### Portable Dust Meter

Type Particulare Monitor

Manufacturer Metone AEROCET 831

**Model Number** 

**Serial Number** Y23160

29-Dec-20 **Performance Check Date** 

Standard Equipment

High Volume Sampler Type

Manufacturer TISCH

**Model Number** TE-5170

**Equipment Number** HVS000

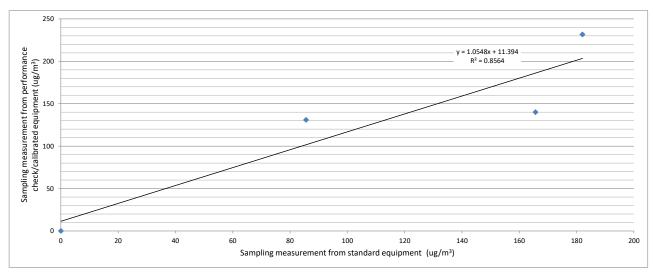
**Last Calibration Date** 28-Dec-20

#### **Portable Dust Meter Performance Check Results**

				Concentration in ug/m <sup>3</sup>	Concentration in ug/m <sup>3</sup>
Trial no. in 1-hr period	Time	Mean Pressure (hPa)	Mean Temp (°C)	(Standard equipment)	(Performance Check / Calibrated equipment)
·		, ,		(X - Axis)	(Y - Axis)
Zero Check	28/12/2020 08:00	0	0	0	0
1	29/12/2020 08:04	1015	21	182	232
2	29/12/2020 09:05	1015	21	166	140
3	29/12/2020 10:06	1015	21	86	131

Linear Regression of Y on X

Slope (K- factor)
Correlation Coefficient
Validity of Performance Check / Calibration Record



Operator:	Henry Lau	Date:	29-Dec-20
Checked by:	James Chu	Date:	30-Dec-20



#### **Portable Dust Meter Performance Check Record**

# Portable Dust Meter

Гуре	: .	Particulare Monitor
<b>Manufacturer</b>	:	Metone AEROCET 831
	-	
Model Number	:	BT-645

**Serial Number** X19298

**Performance Check Date** 22-Mar-21

Standard Equipment

High Volume Sampler Type

Manufacturer TISCH

**Model Number** TE-5170

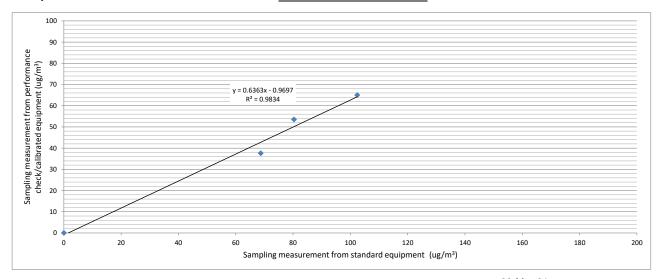
**Equipment Number** HVS018

**Last Calibration Date** 08-Mar-21

#### **Portable Dust Meter Performance Check Results**

Trial no. in 1-hr	Ŧ	Mean Pressure	M - T - (*0)	Concentration in ug/m <sup>3</sup>	Concentration in ug/m <sup>3</sup> (Performance Check /
period	Time	(hPa)	Mean Temp (°C)	(Standard equipment)	Calibrated equipment)
				(X - Axis)	(Y - Axis)
Zero Check	28/12/2020 08:00	0	0	0	0
1	22/3/2021 08:00	1015	21	102	65
2	22/3/2021 09:01	1015	21	80	54
3	22/3/2021 10:01	1015	21	69	38

Linear Regression of Y on X Slope (K- factor) Correlation Coefficient Validity of Performance Check / Calibration Record



Operator:	Alan Ng	Date:	22-Mar-21
Checked by:	James Chu	Date:	23-Mar-21



# Certificate of Calibration

BT-645

Particulate Monitor

Recommended	calibration	interval	is 24	months	from	first da	v o	f use.
-------------	-------------	----------	-------	--------	------	----------	-----	--------

Unit Info Model:	BT-645 8	1865 Firmware Rev:	1.2.0	
Serial Number:	R22586	81113	0.2.5	
Calibrated By:	J. Chester	Cal. Date:	04/13/2021	
Quality Inspector:	A 6	Date:	APR 1 5 2021	
Calibration Hz/µg/m <sup>3</sup> :	6.06			
Final Test				
Flow (2.0 L/min):	Pass	Ambient Temp (C): _	23	
Serial Communication:	Pass	RH (%): _	24	
Concentration:	370	Standard:	372	

#### **Calibration Standards**

Standards	Manufacturer	Model	SN	Cal Due Date
DMM	Fluke	189	92130180	10/26/2021
Temp/Humidity	Met One Instruments	083E-1-6	R20313	09/17/21
Flow Meter	TSI	4000	40419545007	11/21/2021
LD-3B	SIBATA	LD-3B	476795	06/29/2021

The standards used for this calibration have accuracy equal to or greater than the instrument tested. These standards are on record and traceable to NIST to the extent allowed by the institute's calibration facility. Unless otherwise stated, all instruments are calibrated to meet the manufacturer's published specifications. The Calibration system complies with MIL-STD-45662A.



#### ALS Technichem (HK) Pty Ltd

11/F, Chung Shun Knitting Centre 1-3 Wing Yip Street, Kwai Chung N.T., Hong Kong T: +852 2610 1044 | F: +852 2610 2021

# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:

HENRY LAU

CLIENT:

LAM ENVIRONMENTAL SERVICES LTD

ADDRESS:

19/F, REMEX CENTRE,

42 WONG CHUK HANG ROAD,

HONG KONG

WORK ORDER:

HK2102477

SUB- BATCH:

0

LABORATORY:

HONG KONG

DATE RECEIVED:

18- Jan- 2021

DATE OF ISSUE:

27- Jan- 2021

# SPECIFIC COMMENTS

Equipment information (Brand name, Model No., Serial No. and Equipment No.) is provided by client. The performance of the equipment stated in this report is checked with independent reference material and

results compared against a calibrated secondary source.

The "Tolerance Limit" quoted is the acceptance criteria applicable for similar equipment used by the laboratory or quoted from relevant international standards.

The "Next Calibration Date" is recommended according to best practice principle as practised by the laboratory or quoted from relevant international standards.

The validity of equipment/ meter performance only applies to the result(s) stated in the report.

Equipment Type:

Multifunctional Meter

Service Nature:

Performance Check

Scope:

Dissolved Oxygen, pH Value, Salinity and Temperature

Brand Name/ Model No.:

YSI Professional Plus

Serial No./ Equipment No.:

17F100236

Date of Calibration:

21- January- 2021

# GENERAL COMMENTS

This is the Final Report and supersedes any preliminary report with this batch number.

Mr Chan Siu Ming, Vico Manager - Inorganic

Ma Sig

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# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK2102477

SUB- BATCH:

0

DATE OF ISSUE:

27- Jan- 2021

CLIENT:

LAM ENVIRONMENTAL SERVICES LTD

Equipment Type: Brand Name/

Multifunctional Meter

Model No.:

YSI Professional Plus

Serial No./

17F100236

Equipment No.: Date of Calibration:

21- January- 2021

Date of Next Calibration:

21- April- 2021

**PARAMETERS:** 

Dissolved Oxygen

Method Ref: APHA (21st edition), 45000: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
3.97	3.84	- 0.13
6.68	6.55	- 0.13
8.83	8.92	+0.09
	Tolerance Limit (mg/L)	± 0.20

pH Value

Method Ref: APHA (21st edition), 4500H: B

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)
4.0	4.18	+ 0.18
7.0	6.91	- 0.09
10.0	9.49	- 0.51
	Tolerance Limit (pH unit)	±0.20

Salinity

Method Ref: APHA (21st edition), 2520B

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.01	
10	9.82	- 1.8
20	19.23	- 3.9
30	28.62	- 4.6
	Tolerance Limit (%)	± 10.0

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

Mr Chan Siu Ming, Vico Manager - Inorganic

Ma Si

# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER:

HK2102477

SUB- BATCH:

0

DATE OF ISSUE:

27- Jan- 2021

**CLIENT:** 

LAM ENVIRONMENTAL SERVICES LTD

Equipment Type:

Multifunctional Meter

Brand Name/

YSI Professional Plus

Model No.: Serial No./

Equipment No.:

17F100236

Date of Calibration:

21- January- 2021 Date of Next Calibration:

21- April- 2021

**PARAMETERS:** 

**Temperature** 

Method Ref: Section 6 of International Accreditation New Zealand Technical

Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

Expected Reading (°C)	Displayed Reading (°C)	Tolerance (°C)
10.0	10.3	+ 0.3
22.0	21.9	- 0.1
39.0	39.2	+0.2
	Tolerance Limit (°C)	± 2.0

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

Mr Chan Siu Ming, Vico Manager - Inorganic

Ma Sign



# ALS Technichem (HK) Pty Ltd

11/F, Chung Shun Knitting Centre 1-3 Wing Yip Street, Kwai Chung N.T., Hong Kong

T: +852 2610 1044 | F: +852 2610 2021

# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT: HENRY LAU WORK ORDER: HK2107488

CLIENT: LAM ENVIRONMENTAL SERVICES LTD

ADDRESS: 19/F, REMEX CENTRE, SUB-BATCH: C

42 WONG CHUK HANG ROAD, LABORATORY: HONG KONG HONG KONG

DATE RECEIVED: 24-Feb-2021

DATE OF ISSUE: 05-Mar-2021

# SPECIFIC COMMENTS

Equipment information (Brand name, Model No., Serial No. and Equipment No.) is provided by client. The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.

The "Tolerance Limit" quoted is the acceptance criteria applicable for similar equipment used by the laboratory or quoted from relevant international standards.

The "Next Calibration Date" is recommended according to best practice principle as practised by the laboratory or quoted from relevant international standards.

The validity of equipment/ meter performance only applies to the result(s) stated in the report.

Equipment Type: Multifunctional Meter Service Nature: Performance Check

Scope: Dissolved Oxygen, pH Value, Salinity and Temperature

Brand Name/ Model No.: YSI Professional Plus

Serial No./ Equipment No.: 14E100105

Date of Calibration: 05-March-2021

# GENERAL COMMENTS

This is the Final Report and supersedes any preliminary report with this batch number.

Mr Chan Siu Ming, Vico Manager - Inorganic

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# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK2107488

SUB-BATCH: 0

DATE OF ISSUE: 05-Mar-2021

CLIENT: LAM ENVIRONMENTAL SERVICES LTD

Equipment Type: Multifunctional Meter Brand Name/ YSI Professional Plus

Model No.: Serial No./

Equipment No.:

14E100105

Date of Calibration: 05-March-2021

Date of Next Calibration: 05

05-June-2021

PARAMETERS:

Dissolved Oxygen

Method Ref: APHA (21st edition), 45000: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
2.50	2.67	+0.17
5.24	5.18	-0.06
8.32	8.37	+0.05
	Tolerance Limit (mg/L)	±0.20

pH Value Method Ref: APHA (21st edition), 4500H: B

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)
4.0	4.06	+0.06
7.0	6.96	-0.04
10.0	9.93	-0.07
	Tolerance Limit (pH unit)	±0.20

Salinity Method Ref: APHA (21st edition), 2520B

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.02	
10	9.95	-0.5
20	19.96	-0.2
30	29.89	-O.4
	Tolerance Limit (%)	±10.0

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

Mr Chan Siu Ming, Vico

Ma Si

Manager - Inorganic

# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK2107488

SUB-BATCH: 0

DATE OF ISSUE: 05-Mar-2021

CLIENT: LAM ENVIRONMENTAL SERVICES LTD

Equipment Type: Multifunctional Meter Brand Name/

Model No.:

YSI Professional Plus

Serial No./
Equipment No.:

14E100105

Date of Calibration: 05-March-2021 Date of Next Calibration: 05-June-2021

PARAMETERS:

Temperature Method Ref: Section 6 of International Accreditation New Zealand Technical

Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

Expected Reading (°C)	Displayed Reading (°C)	Tolerance (°C)
10.0	10.2	+0.2
21.0	20.8	-0.2
39.0	38.6	-0.4
	Tolerance Limit (°C)	±2.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless

of equipment precision or significant figures.

Mr Chan Siu Ming, Vico Manager - Inorganic

Ma Ship



# REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

Information supplied	by customer:		
CONTACT:	MR. JAMES CHU	JOB REFERENCE NO.:	22777053-A04B410

LAM ENVIRONMENTAL SERVICES CLIENT:

DATE RECEIVED: 04/01/2021 13/01/2021 DATE OF ISSUE:

19/F, REMAX CENTRE,42 WONG CHUK HANG ROAD,HONG ADDRESS:

**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 FT Laboratories Ltd will be followed.

Scope of Test:	Turbidity
Equipment Type:	Turbidimeter
Brand Name:	Xin Rui
Model No.:	WGZ-3B
Serial No.:	2005060
Equipment No.:	
Date of Calibration:	13/01/2021

#### 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.

Certified By:

Ho Lai Sze Senior Chemist Issue Date:

13/01/2021



# REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

WORK ORDER: 22777053-A04B4101

**DATE OF ISSUE:** 13/01/2021

CLIENT:

LAM ENVIRONMENTAL SERVICES

Equipment Type:	Turbidimeter
Brand Name:	Xin Rui
Model No.:	WGZ-3B
Serial No.:	2005060
Equipment No.:	13/01/2021
Date of Calibration:	
Date of next Calibation:	15/04/2021
Lab I.D.:	H210002-01

#### Parameters:

**Turbidity** 

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

Method Ref. AF HA 22 Ed. 2130b		m 1
Expected Reading (NTU)	Display Reading (NTU)	Tolerance
0	0.00	
4	4.00	0.0%
10	9.96	-0.4%
40	39.99	0.0%
100		-0.3%
400		-1.2%
1000		-1.3%
1000	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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Page 2 of 2



REPORT OF EQUI	PMENT PERFORMANCE CHECK /	CALIBRATION			
Information supplied	l by customer:				
CONTACT:	MR. JAMES CHU	JOB REFERENCE NO.:	22777053-A22B4801		
CLIENT:	LAM ENVIRONMENTAL SERVICES				
DATE RECEIVED:					
DATE OF ISSUE:	29/01/2021				
ADDRESS:		CHILL HANC BOAD HONG	•		
ADDRESS.	19/F, REMAX CENTRE,42 WONG CHUK HANG ROAD,HONG KONG				
PROJECT:					
METHOD OF PERF	ORMANCE CHECK/ CALIBRATIO	ON:	1		
Ref: APHA22nd ed 21					
COMMENTS					
It is certified that the it	em under performance check/calibration	has been calibrated/checked by	corresponding calibrated		
equipment in the labor		•			
	nd calibration frequency stated in the rep	ort, unless otherwise stated, the	internal acceptance criteria of		
FT Laboratories Ltd w					
Scope of Test:		Turbidity			
Equipment Type:		Turbidimeter			
Brand Name:					
		Xin Rui			
Model No.:		WGZ-3B			
Serial No.:		1807063			
Equipment No.:					
Date of Calibration:		29/01/2021			
Remarks:					
This is the Final Report release.	t. Results apply to sample(s) as submitted	d. All pages of this report have b	een checked and approved for		
Certified By:	Ho Lai Sze	Issue Date:	29/01/2021		
	Senior Chemist				

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Form No.: HG022-002 Rev 0 20190101

Page 1 of 2



# REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

WORK ORDER:

22777053-A22B4801

DATE OF ISSUE:

29/01/2021

CLIENT:

LAM ENVIRONMENTAL SERVICES

Equipment Type:	Turbidimeter	
Brand Name:	Xin Rui	
Model No.:	WGZ-3B	
Serial No.:	1807063	
Equipment No.:		
Date of Calibration:	29/01/2021	
Date of next Calibation:	01/05/2021	
Lab I.D.:	H210012-01	

#### Parameters:

Turbidity

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

Expected Reading (NTU)	Display Reading (NTU)	Tolerance	
0	0.00		
4	3.67	-8.3%	
10	10.07	0.7%	
40	37.88	-5.3%	
100	100.00	0.0%	
400	438	9.5%	
1000	1002	0.2%	
	Tolerance Limit (±)	10%	

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

Form No.: HG022-002 Rev 0 20190101