



## CERTIFICATE OF CALIBRATION

Certificate No.: 20CA0214 01-02 Page 1 of 2

### Item tested

Description:	Sound Level Meter (Type 1)	,	Microphone	Preamp
Manufacturer:	Nti	,	Nti Andio	Nti Andio
Type/Model No.:	XL2	,	MC230A	MA220
Serial/Equipment No.:	A2A-15269-EO	,	A14232	6830
Adaptors used:	-	,		

### Item submitted by

Customer Name: Lam Environmental Services Limited.  
 Address of Customer: -  
 Request No.: -  
 Date of receipt: 14-Feb-2020

Date of test: 17-Feb-2020

### Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	23-Aug-2020	CIGISMEC
Signal generator	DS 360	33873	10-May-2020	CEPREI

### Ambient conditions

Temperature: 21 ± 1 °C  
 Relative humidity: 55 ± 10 %  
 Air pressure: 1000 ± 5 hPa

### Test specifications

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

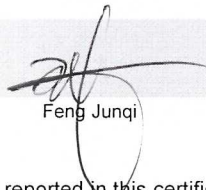
### Test results

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

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

Actual Measurement data are documented on worksheets.

Approved Signatory:



Feng Junqi

Date: 18-Feb-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.



## 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			
Time weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Peak response	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
R.M.S. accuracy	Single 100µs rectangular pulse	Pass	0.3	
Time weighting I	Crest factor of 3	Pass	0.3	
	Single burst 5 ms at 2000 Hz	Pass	0.3	
Time averaging	Repeated at frequency of 100 Hz	Pass	0.3	
	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:		Checked by:	
Date:	Fung Chi Yip 17-Feb-2020	Date:	Shek Kwong Tat 18-Feb-2020

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.



Test Data for Sound Level Meter

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Sound level meter type: XL2 Serial No. A2A-15269-EO Date 17-Feb-2020  
Microphone type: MC230A Serial No. A14232

Report: 20CA0214 01-02

### SELF GENERATED NOISE TEST

The noise test is performed in the most sensitive range of the SLM with the microphone replaced by an equivalent impedance.

Noise level in A weighting 10.5 dB  
Noise level in C weighting 14.2 dB  
Noise level in Lin 21.4 dB

### LINEARITY TEST

The linearity is tested relative to the reference sound pressure level using a continuous sinusoidal signal of frequency 4 kHz. The measurement is made on the reference range for indications at 5 dB intervals starting from the 94 dB reference sound pressure level. And until within 5 dB of the upper and lower limits of the reference range, the measurements shall be made at 1 dB intervals. (SLM set to LEQ/SPL)

Reference/Expected level	Actual level		Tolerance	Deviation	
	non-integrated	integrated		non-integrated	integrated
dB	dB	dB	+/- dB	dB	dB
94.0	94.0	94.0	0.7	0.0	0.0
99.0	99.0	99.0	0.7	0.0	0.0
104.0	104.0	104.0	0.7	0.0	0.0
109.0	109.0	109.0	0.7	0.0	0.0
114.0	114.0	114.0	0.7	0.0	0.0
115.0	115.0	115.0	0.7	0.0	0.0
116.0	116.0	116.0	0.7	0.0	0.0
117.0	117.0	117.0	0.7	0.0	0.0
118.0	118.0	118.0	0.7	0.0	0.0
119.0	119.0	119.0	0.7	0.0	0.0
120.0	120.0	120.0	0.7	0.0	0.0
89.0	89.0	89.0	0.7	0.0	0.0
84.0	84.0	84.0	0.7	0.0	0.0
79.0	79.0	79.0	0.7	0.0	0.0
74.0	74.0	74.0	0.7	0.0	0.0
69.0	69.0	69.0	0.7	0.0	0.0
64.0	64.0	64.0	0.7	0.0	0.0
59.0	59.0	59.0	0.7	0.0	0.0
54.0	54.0	54.0	0.7	0.0	0.0
49.0	49.0	49.0	0.7	0.0	0.0
44.0	44.0	44.0	0.7	0.0	0.0
39.0	39.0	39.0	0.7	0.0	0.0
34.0	34.1	34.1	0.7	0.1	0.1
33.0	33.1	33.1	0.7	0.1	0.1



Test Data for Sound Level Meter

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Sound level meter type: XL2 Serial No. A2A-15269-EO Date 17-Feb-2020  
Microphone type: MC230A Serial No. A14232

Report: 20CA0214 01-02

32.0	32.2	32.2	0.7	0.2	0.2
31.0	31.2	31.2	0.7	0.2	0.2
30.0	30.3	30.3	0.7	0.3	0.3

Measurements for an indication of the reference SPL on all other ranges which include it

Other ranges	Expected level	Actual level	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
40-140	94.0	94.0	0.7	0.0
20-120	94.0	94.0	0.7	0.0
0-100	94.0	94.0	0.7	0.0

Measurements on all level ranges for indications 2 dB below the upper limit and 2 dB above the lower limit

Ranges	Reference/Expected level	Actual level	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
40-140	52.0	52.5	0.7	0.5
	138.0	138.0	0.7	0.0
20-120	30.0	30.3	0.7	0.3
	118.0	118.0	0.7	0.0
0-100	30.0	30.0	0.7	0.0
	98.0	98.0	0.7	0.0

## FREQUENCY WEIGHTING TEST

The frequency response of the weighting networks are tested at octave intervals over the frequency ranges 31.5 Hz to 12500 Hz. The signal level at 1000 Hz is set to give an indication of the reference SPL.

Frequency weighting A:

Frequency	Ref. level	Expected level	Actual level	Tolerance(dB)		Deviation
				+	-	
Hz	dB	dB	dB	+	-	dB
1000.0	94.0	94.0	94.0	0.0	0.0	0.0
31.6	94.0	54.6	54.7	1.5	1.5	0.1
63.1	94.0	67.8	67.7	1.5	1.5	-0.1
125.9	94.0	77.9	77.9	1.0	1.0	0.0
251.2	94.0	85.4	85.4	1.0	1.0	0.0
501.2	94.0	90.8	90.8	1.0	1.0	0.0
1995.0	94.0	95.2	95.2	1.0	1.0	0.0
3981.0	94.0	95.0	95.0	1.0	1.0	0.0
7943.0	94.0	92.9	92.9	1.5	3.0	0.0
12590.0	94.0	89.7	89.6	3.0	6.0	-0.1

Frequency weighting C:

Frequency	Ref. level	Expected level	Actual level	Tolerance(dB)		Deviation
				+	-	
Hz	dB	dB	dB	+	-	dB



Test Data for Sound Level Meter

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Sound level meter type: XL2 Serial No. A2A-15269-EO Date 17-Feb-2020  
Microphone type: MC230A Serial No. A14232

Report: 20CA0214 01-02

1000.0	94.0	94.0	94.0	0.0	0.0	0.0
31.6	94.0	91.0	90.9	1.5	1.5	-0.1
63.1	94.0	93.2	93.1	1.5	1.5	-0.1
125.9	94.0	93.8	93.8	1.0	1.0	0.0
251.2	94.0	94.0	94.0	1.0	1.0	0.0
501.2	94.0	94.0	94.0	1.0	1.0	0.0
1995.0	94.0	93.8	93.8	1.0	1.0	0.0
3981.0	94.0	93.2	93.2	1.0	1.0	0.0
7943.0	94.0	91.0	91.0	1.5	3.0	0.0
12590.0	94.0	87.8	87.6	3.0	6.0	-0.2

Frequency weighting Lin:

Frequency Hz	Ref. level dB	Expected level dB	Actual level dB	Tolerance(dB)		Deviation dB
				+	-	
1000.0	94.0	94.0	94.0	0.0	0.0	0.0
31.6	94.0	94.0	93.9	1.5	1.5	-0.1
63.1	94.0	94.0	93.9	1.5	1.5	-0.1
125.9	94.0	94.0	94.0	1.0	1.0	0.0
251.2	94.0	94.0	94.0	1.0	1.0	0.0
501.2	94.0	94.0	94.0	1.0	1.0	0.0
1995.0	94.0	94.0	94.0	1.0	1.0	0.0
3981.0	94.0	94.0	94.0	1.0	1.0	0.0
7943.0	94.0	94.0	94.0	1.5	3.0	0.0
12590.0	94.0	94.0	94.0	3.0	6.0	0.0

Note: No corrections for the frequency response of the microphone, instrument case and windshield are made to the sound level meter.

TIME WEIGHTING FAST TEST

Time weighting F is tested on the reference range with a single sinusoidal burst of duration 200 ms at a frequency 2000 Hz and an amplitude which produces an indication 4 dB below the upper limit of the primary indicator range when the signal is continuous. (Weight A, Maximum hold)

Ref. level dB	Expected level dB	Actual level dB	Tolerance(dB)		Deviation dB
			+	-	
116.0	115.0	115.0	1.0	1.0	0.0

TIME WEIGHTING SLOW TEST

Time weighting S is tested on the reference range with a single sinusoidal burst of duration 500 ms at a frequency 2000 Hz and an amplitude which produces an indication 4 dB below the upper limit of the primary indicator range when the signal is continuous. (Weight A, Maximum hold)

Ref. level dB	Expected level dB	Actual level dB	Tolerance(dB)		Deviation dB
			+	-	
116.0	111.9	111.9	1.0	1.0	0.0



Test Data for Sound Level Meter

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Sound level meter type: XL2 Serial No. A2A-15269-EO Date 17-Feb-2020  
Microphone type: MC230A Serial No. A14232

Report: 20CA0214 01-02

### PEAK RESPONSE TEST

The onset time of the peak detector is tested on the reference range by comparing the response to a 100 us rectangular test pulse with the response to a 10 ms reference pulse of the same amplitude. The amplitude of the 10 ms reference pulse is such as to produce an indication 1 dB below the upper limit of the primary indicator range.

Positive polarities: (Weighting Z, set the generator signal to single, Lzpeak)

Ref. level	Response to 10 ms	Response to 100 us	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
119.0	119.0	119.4	2.0	0.4

Negative polarities:

Ref. level	Response to 10 ms	Response to 100 us	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
119.0	119.0	119.4	2.0	0.4

### RMS ACCURACY TEST

The RMS detector accuracy is tested on the reference range for a crest factor of 3.

Test frequency: 2000 Hz  
Amplitude: 2 dB below the upper limit of the primary indicator range.  
Burst repetition frequency: 40 Hz  
Tone burst signal: 11 cycles of a sine wave of frequency 2000 Hz. (Set to INT)

	Ref. Level	Expected level	Tone burst signal	Tolerance	Deviation
Time weighting	dB	dB	indication(dB)	+/- dB	dB
Slow	118.0+6.6	118.0	118.0	0.5	0.0

### TIME WEIGHTING IMPULSE TEST

Time weighting I is tested on the reference range (Set the SLM to LAImax)

Test frequency: 2000 Hz  
Amplitude: The upper limit of the primary indicator range.

Single sinusoidal burst of duration 5 ms:

Ref. Level	Single burst indication		Tolerance	Deviation
dB	Expected (dB)	Actual (dB)	+/- dB	dB
120.0	111.2	111.1	2.0	-0.1

Repeated at 100 Hz

Ref. Level	Repeated burst indication		Tolerance	Deviation
dB	Expected (dB)	Actual (dB)	+/- dB	dB
120.0	117.3	117.2	1.0	-0.1

### TIME AVERAGING TEST

This test compares the SLM reading for continuous sine signals with readings obtained from a sine tone burst sequence having the same RMS level. The test level is 30 dB below the upper limit of the linearity range and repeated for Type 1 SLM with 40 dB below the upper limit of the linearity.

Frequency of tone burst: 4000 Hz

Duration of tone burst: 1 ms

Repetition Time	Level of tone burst	Expected Leq	Actual Leq	Tolerance	Deviation	Remarks



Test Data for Sound Level Meter

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Sound level meter type: XL2 Serial No. A2A-15269-EO Date 17-Feb-2020  
Microphone type: MC230A Serial No. A14232  
Report: 20CA0214 01-02

msec	dB	dB	dB	+/- dB	dB	
1000	90.0	90.0	89.9	1.0	-0.1	60s integ.
10000	80.0	80.0	79.9	1.0	-0.1	6min. integ.

PULSE RANGE AND SOUND EXPOSURE LEVEL TEST

The test tone burst signal is superimposed on a baseline signal corresponding to the lower limit of reference range

Test frequency: 4000 Hz  
Integration time: 10 sec

The integrating sound level meter set to Leq:

Duration	Rms level of	Expected	Actual	Tolerance	Deviation
msec	tone burst (dB)	dB	dB	+/- dB	dB
10	88.0	58.0	58.0	1.7	0.0

The integrating sound level meter set to SEL:

Duration	Rms level of	Expected	Actual	Tolerance	Deviation
msec	tone burst (dB)	dB	dB	+/- dB	dB
10.0	88.0	68.0	68.0	1.7	0.0

OVERLOAD INDICATION TEST

For SLM capable of operating in a non-integrating mode.

Test frequency: 2000 Hz  
Amplitude: 2 dB below the upper limit of the primary indicator range.  
Burst repetition frequency: 40 Hz  
Tone burst signal: 11 cycles of a sine wave of frequency 2000 Hz.

Level	Level reduced by	Further reduced	Difference	Tolerance	Deviation
at overload (dB)	1 dB	3 dB	dB	dB	dB
121.6	120.6	117.6	3.0	1.0	0.0

For integrating SLM, with the instrument indicating Leq.

For integrating SLM, with the instrument indicating Leq and set to the reference range. The test signal as following:

The test tone burst signal is superimposed on a baseline signal corresponding to the lower limit of reference range

Test frequency: 4000 Hz  
Integration time: 10 sec  
Single burst duration: 1 msec

Rms level	Level reduced by	Expected level	Actual level	Tolerance	Deviation
at overload (dB)	1 dB	dB	dB	dB	dB
127.6	126.6	86.6	86.6	2.2	0.0

ACOUSTIC TEST

The acoustic test of the complete SLM is tested at the frequency 125 Hz and 8000 Hz using a B&K type 4226 Multifunction Acoustic Calibrator. The test is performed in A weighting.

Frequency	Expected level	Actual level	Tolerance (dB)		Deviation
Hz	dB	Measured (dB)	+	-	dB



Test Data for Sound Level Meter

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Sound level meter type: XL2 Serial No. A2A-15269-EO Date 17-Feb-2020  
Microphone type: MC230A Serial No. A14232

Report: 20CA0214 01-02

1000	94.0	94.0	0.0	0.0	0.0
125	77.9	77.9	1.0	1.0	0.0
8000	92.9	92.0	1.5	3.0	-0.9

-----END-----





## CERTIFICATE OF CALIBRATION

Certificate No.: 19CA1105 03

Page: 1 of 2

### Item tested

Description: Acoustical Calibrator (Class 1)  
Manufacturer: Larson Davis  
Type/Model No.: CAL200  
Serial/Equipment No.: 13437  
Adaptors used: -

### Item submitted by

Customer: Lam Environmental Services Limited.  
Address of Customer: -  
Request No.: -  
Date of receipt: 05-Nov-2019

Date of test: 06-Nov-2019

### Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2341427	03-May-2020	SCL
Preamplifier	B&K 2673	2239857	17-May-2020	CEPREI
Measuring amplifier	B&K 2610	2346941	05-Jun-2020	CEPREI
Signal generator	DS 360	33873	10-May-2020	CEPREI
Digital multi-meter	34401A	US36087050	08-May-2020	CEPREI
Audio analyzer	8903B	GB41300350	13-May-2020	CEPREI
Universal counter	53132A	MY40003662	10-May-2020	CEPREI

### Ambient conditions

Temperature:  $21 \pm 1$  °C  
Relative humidity:  $50 \pm 10$  %  
Air pressure:  $1000 \pm 5$  hPa

### Test specifications

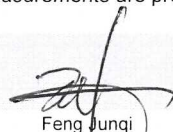
- The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.
- The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.
- The results 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:

  
Feng Junqi

Date: 06-Nov-2019

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.: 19CA1105 03 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	93.83	0.10

(Output level in dB re 20  $\mu$ Pa)

### 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 = 0.031 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 = 1000.2 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:

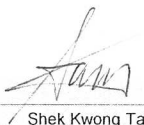
**At 1000 Hz** **TND = 0.5%**

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.

- End -

Calibrated by:   
 Date: 06-Nov-2019

Checked by:   
 Date: 06-Nov-2019

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.



**Portable Dust Meter Performance Check Record**

**Portable Dust Meter**

Type : Particulate Monitor  
 Manufacturer : Metone AEROCET 831  
 Model Number : 831  
 Serial Number : W16848  
 Performance Check Date : 6-Nov-19

**Standard Equipment**

Type : High Volume Sampler  
 Manufacturer : TISCH  
 Model Number : TE-5170  
 Equipment Number : HVS018  
 Last Calibration Date : 30-Sep-19

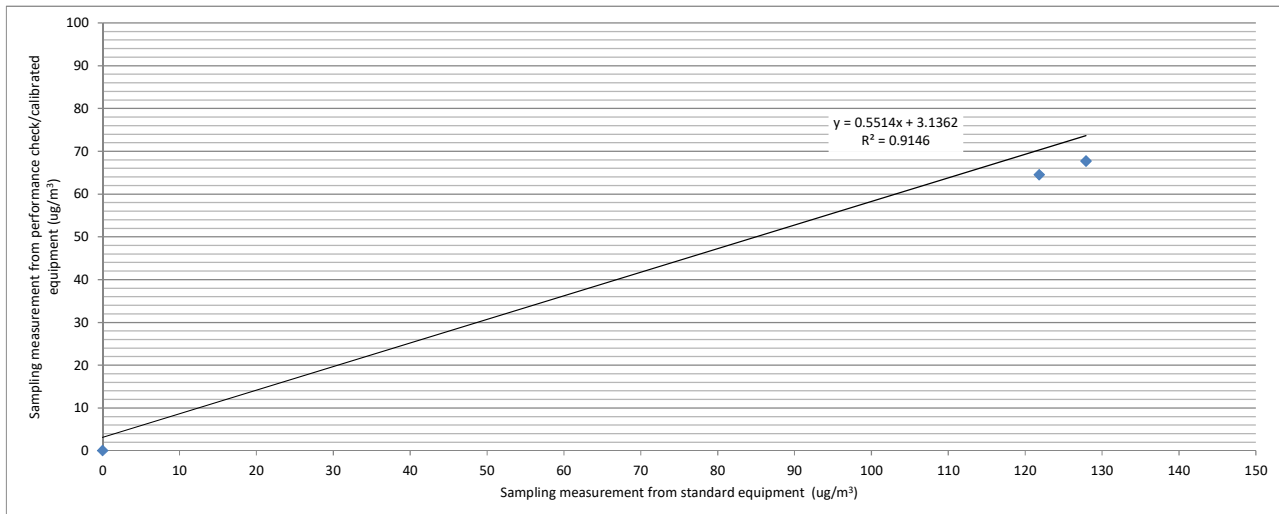
**Portable Dust Meter Performance Check Results**

Trial no. in 1-hr period	Time	Mean Pressure (hPa)	Mean Temp (°C)	Concentration in ug/m <sup>3</sup> (Standard equipment) (Y - Axis)	Concentration in ug/m <sup>3</sup> (Performance Check / Calibrated equipment) (X - Axis)
Zero Check	5/11/2019 08:00	1013	24	0	0
1	6/11/2019 18:41	1012	24	99	72
2	6/11/2019 19:43	1012	24	128	68
3	6/11/2019 20:44	1012	24	122	65

\* Filter paper weighting was conducted by HOKLAS accredited laboratory.

**Linear Regression of Y on X**

Slope (K- factor) : 1.7000  
 Correlation Coefficient : 0.9563  
 Validity of Performance Check / Calibration Record : 5/11/2020



Operator: Alan Ng Date: 6-Nov-19  
 Checked by: James Chu Date: 7-Nov-19



**Portable Dust Meter Performance Check Record**

**Portable Dust Meter**

Type : Particulate Monitor  
 Manufacturer : Metone AEROCET 831  
 Model Number : 831  
 Serial Number : Y23153  
 Performance Check Date : 3-Jan-20

**Standard Equipment**

Type : High Volume Sampler  
 Manufacturer : TISCH  
 Model Number : TE-5170  
 Equipment Number : HVS018  
 Last Calibration Date : 29-Nov-19

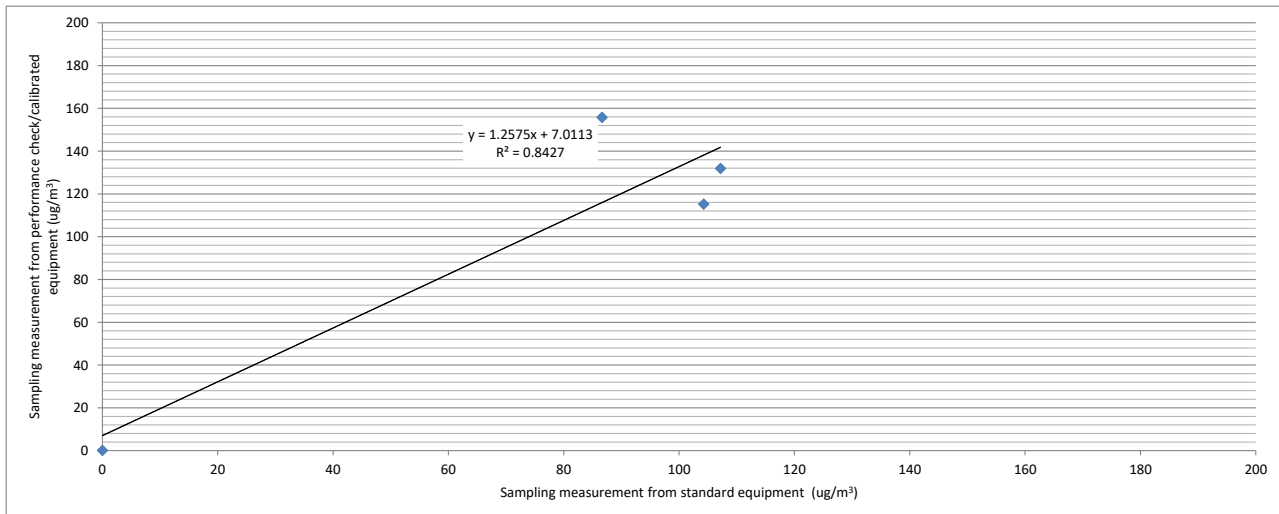
**Portable Dust Meter Performance Check Results**

Trial no. in 1-hr period	Time	Mean Pressure (hPa)	Mean Temp (°C)	Concentration in ug/m <sup>3</sup> (Standard equipment) (Y - Axis)	Concentration in ug/m <sup>3</sup> (Performance Check / Calibrated equipment) (X - Axis)
Zero Check	2/1/2019 08:00	1025	18	0	0
1	3/1/2020 09:26	1023	19	87	156
2	3/1/2020 10:27	1023	19	104	115
3	3/1/2020 11:28	1023	19	107	132

\* Filter paper weighting was conducted by HOKLAS accredited laboratory.

**Linear Regression of Y on X**

Slope (K- factor) : 0.7000  
 Correlation Coefficient : 0.9180  
 Validity of Performance Check / Calibration Record : 2/1/2021



Operator: Henry Lau Date: 3-Jan-20  
 Checked by: James Chu Date: 4-Jan-20



Portable Dust Meter Performance Check Record

Portable Dust Meter

Type : Particulate Monitor
Manufacturer : Metone AEROCET 831
Model Number : 831
Serial Number : Y23154
Performance Check Date : 3-Jan-20

Standard Equipment

Type : High Volume Sampler
Manufacturer : TISCH
Model Number : TE-5170
Equipment Number : HVS018
Last Calibration Date : 29-Nov-19

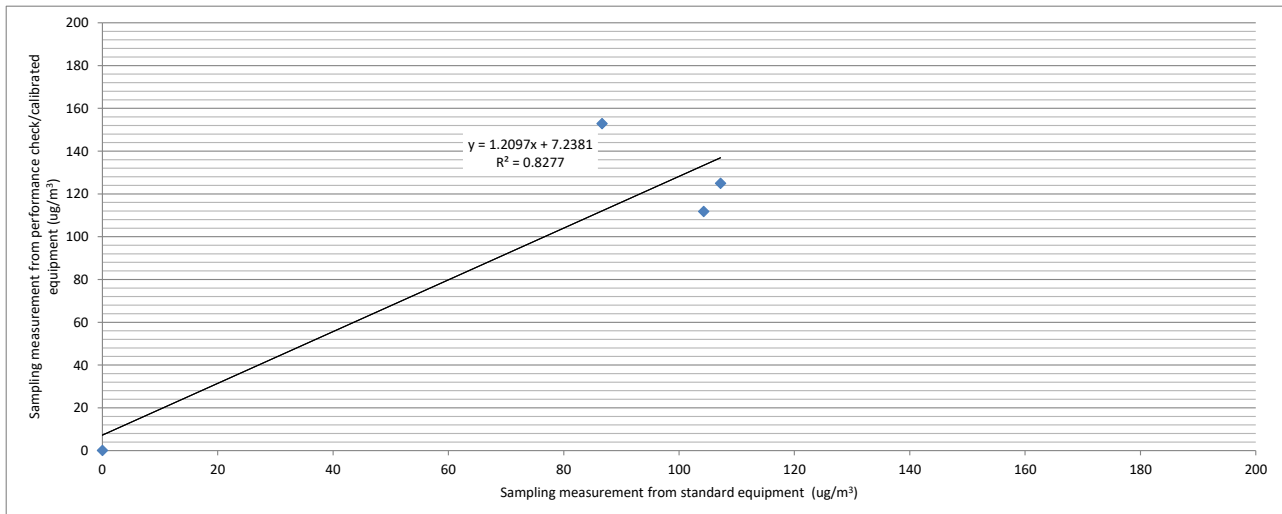
Portable Dust Meter Performance Check Results

Table with 6 columns: Trial no. in 1-hr period, Time, Mean Pressure (hPa), Mean Temp (°C), Concentration in ug/m³ (Standard equipment) (Y - Axis), Concentration in ug/m³ (Performance Check / Calibrated equipment) (X - Axis). Rows include Zero Check and trials 1, 2, 3.

\* Filter paper weighting was conducted by HOKLAS accredited laboratory.

Linear Regression of Y on X

Slope (K- factor) : 0.7000
Correlation Coefficient : 0.9098
Validity of Performance Check / Calibration Record : 2/1/2021



Operator: Henry Lau

Date: 3-Jan-20

Checked by: James Chu

Date: 4-Jan-20



Portable Dust Meter Performance Check Record

Portable Dust Meter

Type : Particulate Monitor
Manufacturer : Metone AEROCET 831
Model Number : 831
Serial Number : Y23160
Performance Check Date : 3-Jan-20

Standard Equipment

Type : High Volume Sampler
Manufacturer : TISCH
Model Number : TE-5170
Equipment Number : HVS018
Last Calibration Date : 29-Nov-19

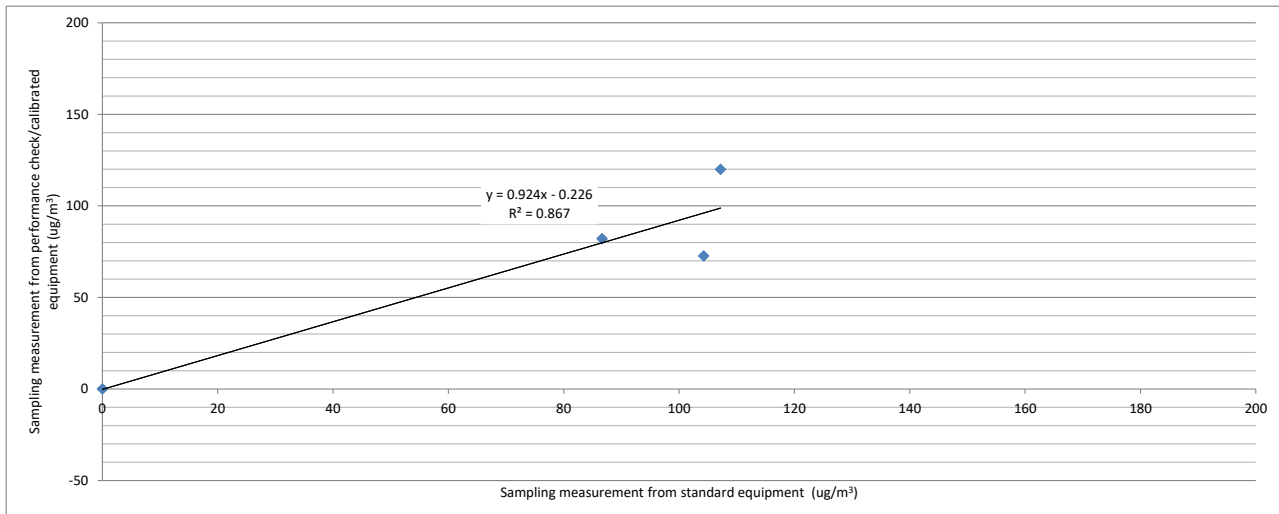
Portable Dust Meter Performance Check Results

Table with 6 columns: Trial no. in 1-hr period, Time, Mean Pressure (hPa), Mean Temp (°C), Concentration in ug/m³ (Standard equipment), Concentration in ug/m³ (Performance Check / Calibrated equipment). Rows include Zero Check and trials 1, 2, 3.

\* Filter paper weighting was conducted by HOKLAS accredited laboratory.

Linear Regression of Y on X

Slope (K- factor) : 1.0000
Correlation Coefficient : 0.9311
Validity of Performance Check / Calibration Record : 2/1/2021



Operator: Henry Lau

Date: 3-Jan-20

Checked by: James Chu

Date: 4-Jan-20



**Portable Dust Meter Performance Check Record**

**Portable Dust Meter**

Type : Particulate Monitor  
 Manufacturer : Metone AEROCET 831  
 Model Number : 831  
 Serial Number : W15449  
 Performance Check Date : 7-Dec-19

**Standard Equipment**

Type : High Volume Sampler  
 Manufacturer : TISCH  
 Model Number : TE-5170  
 Equipment Number : HVS002  
 Last Calibration Date : 18-Oct-19

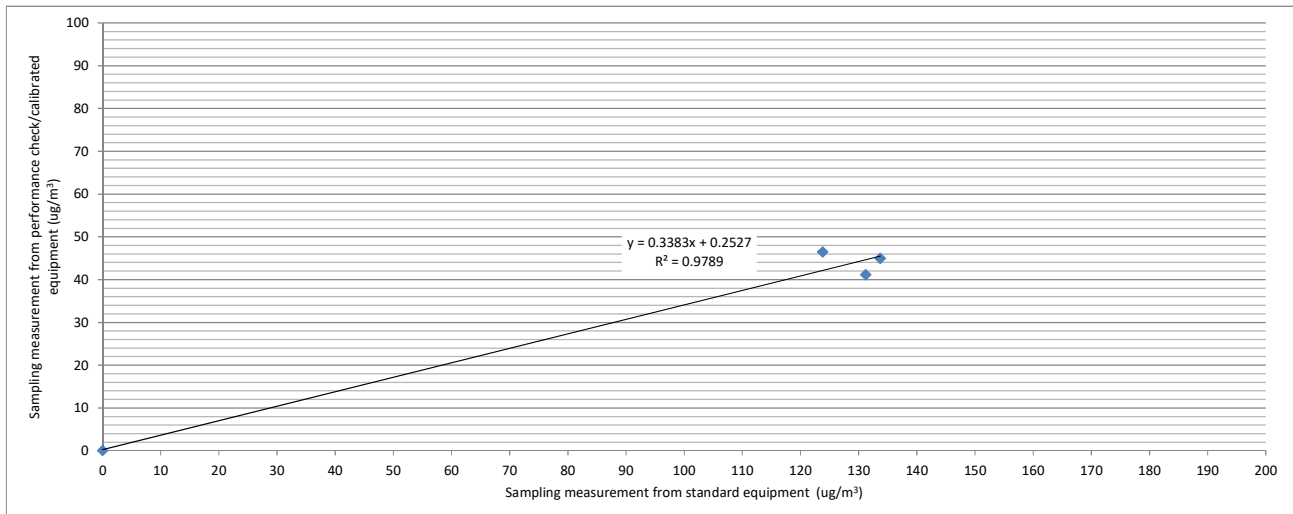
**Portable Dust Meter Performance Check Results**

Trial no. in 1-hr period	Time	Mean Pressure (hPa)	Mean Temp (°C)	Concentration in ug/m <sup>3</sup> (Standard equipment) (Y - Axis)	Concentration in ug/m <sup>3</sup> (Performance Check / Calibrated equipment) (X - Axis)
Zero Check	6/12/2019 08:00	1025	17	0	0
1	7/12/2019 09:45	1025	16	131	41
2	7/12/2019 10:46	1025	16	124	46
3	7/12/2019 13:00	1025	16	134	45

\* Filter paper weighting was conducted by HOKLAS accredited laboratory.

**Linear Regression of Y on X**

Slope (K- factor) : 2.9000  
 Correlation Coefficient : 0.9894  
 Validity of Performance Check / Calibration Record : 6/12/2020



Operator: Alan Ng Date: 7-Dec-19  
 Checked by: James Chu Date: 8-Dec-19



Portable Dust Meter Performance Check Record

Portable Dust Meter

Type : Particulate Monitor
Manufacturer : MET ONE INSTRUMENTS
Model Number : BT645
Serial Number : X19299
Performance Check Date : 17-Mar-20

Standard Equipment

Type : High Volume Sampler
Manufacturer : TISCH
Model Number : TE-5170
Equipment Number : HVS006
Last Calibration Date : 07-Mar-20

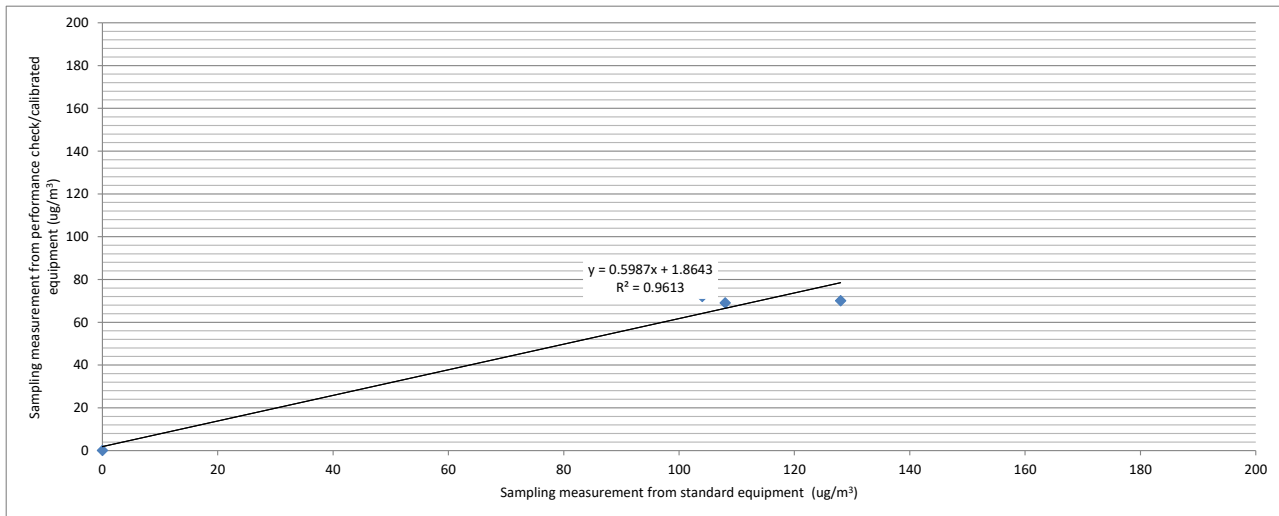
Portable Dust Meter Performance Check Results

Table with 6 columns: Trial no. in 1-hr period, Time, Mean Pressure (hPa), Mean Temp (°C), Concentration in ug/m³ (Standard equipment) (X - Axis), Concentration in ug/m³ (Performance Check / Calibrated equipment) (Y - Axis). Rows include Zero Check and trials 1, 2, 3.

\* Filter paper weighting was conducted by HOKLAS accredited laboratory.

Linear Regression of Y on X

Slope (K- factor) : 1.7000
Correlation Coefficient : 0.9805
Validity of Performance Check / Calibration Record : 17/3/2021



Operator: Henry Lau

Date: 17-Mar-20

Checked by: James Chu

Date: 18-Mar-20





**Portable Dust Meter Performance Check Record**

**Portable Dust Meter**

Type : Particulare Monitor  
 Manufacturer : MET ONE INSTRUMENTS  
 Model Number : BT645  
 Serial Number : X19297  
 Performance Check Date : 17-Mar-20

**Standard Equipment**

Type : High Volume Sampler  
 Manufacturer : TISCH  
 Model Number : TE-5170  
 Equipment Number : HVS0003  
 Last Calibration Date : 07-Mar-20

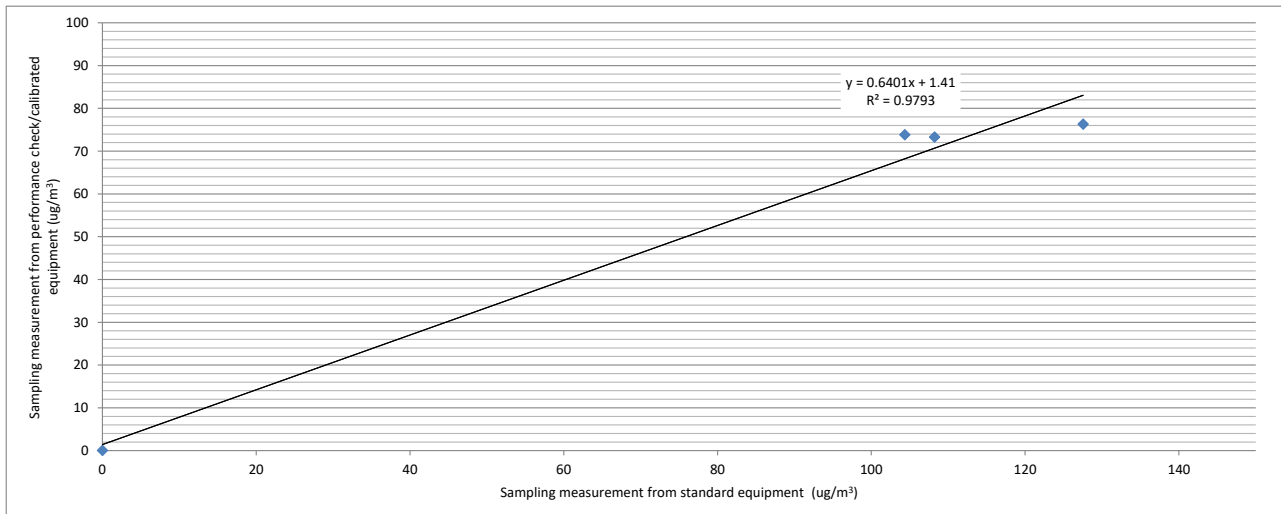
**Portable Dust Meter Performance Check Results**

Trial no. in 1-hr period	Time	Mean Pressure (hPa)	Mean Temp (°C)	Concentration in ug/m <sup>3</sup> (Standard equipment) (Y - Axis)	Concentration in ug/m <sup>3</sup> (Performance Check / Calibrated equipment) (X - Axis)
Zero Check	16/3/2020 08:00	1020	20	0	0
1	17/3/2020 08:16	1019	20	108	73
2	17/3/2020 09:17	1019	20	128	76
3	17/3/2020 10:18	1019	20	104	74

\* Filter paper weighting was conducted by HOKLAS accredited laboratory.

**Linear Regression of Y on X**

Slope (K- factor) : 1.6000  
 Correlation Coefficient : 0.9896  
 Validity of Performance Check / Calibration Record : 17/3/2021



Operator: Henry Lau Date: 17-Mar-20  
 Checked by: James Chu Date: 18-Mar-20



Portable Dust Meter Performance Check Record

Portable Dust Meter

Type : Particulate Monitor
Manufacturer : MET ONE INSTRUMENTS
Model Number : 831
Serial Number : R22586
Performance Check Date : 02-May-20

Standard Equipment

Type : High Volume Sampler
Manufacturer : TISCH
Model Number : TE-5170
Equipment Number : HVS006
Last Calibration Date : 07-Mar-20

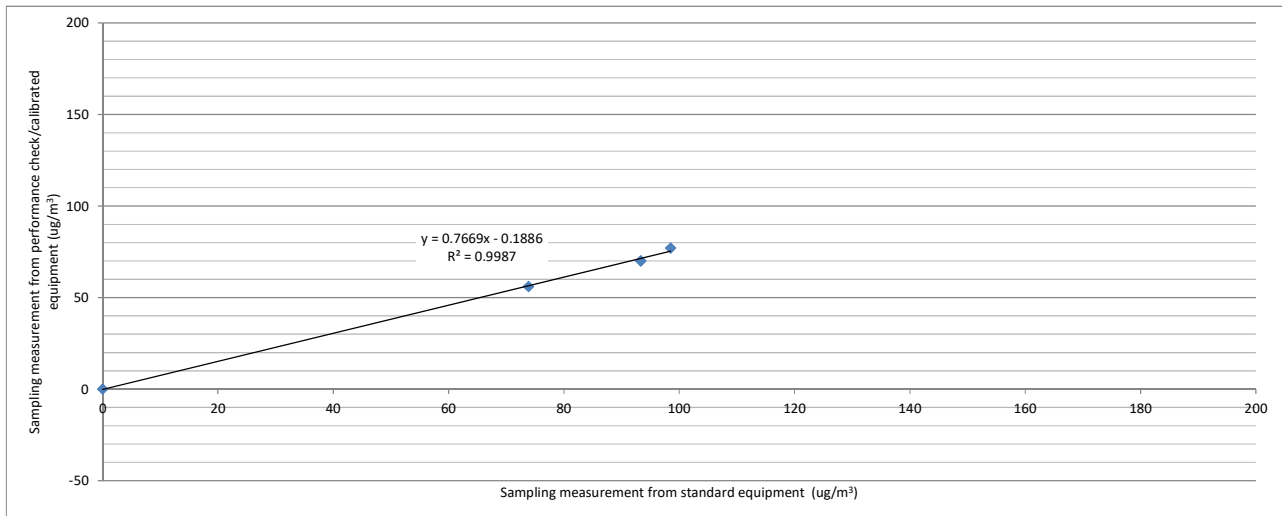
Portable Dust Meter Performance Check Results

Table with 6 columns: Trial no. in 1-hr period, Time, Mean Pressure (hPa), Mean Temp (°C), Concentration in ug/m³ (Standard equipment), Concentration in ug/m³ (Performance Check / Calibrated equipment). Rows include Zero Check and trials 1, 2, 3.

\* Filter paper weighting was conducted by HOKLAS accredited laboratory.

Linear Regression of Y on X

Slope (K- factor) : 1.4000
Correlation Coefficient : 0.9993
Validity of Performance Check / Calibration Record : 2/5/2021



Operator: Henry Lau

Date: 02-May-20

Checked by: James Chu

Date: 03-May-20



## REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT: JAMES CHU  
CLIENT: LAM ENVIRONMENTAL SERVICES LTD  
ADDRESS: 11/F CENTRE POINT,  
181-185 GLOUCESTER ROAD,  
WANCHAI, HONG KONG

WORK ORDER: HK2024178  
SUB-BATCH: 0  
LABORATORY: HONG KONG  
DATE RECEIVED: 30-Jun-2020  
DATE OF ISSUE: 10-Jul-2020

### 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: 10-July-2020

### GENERAL COMMENTS

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

Ms. Lin Wai Yu, Iris  
Assistant Manager - Inorganic

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# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



**WORK ORDER:** HK2024178  
**SUB-BATCH:** 0  
**DATE OF ISSUE:** 10-Jul-2020  
**CLIENT:** LAM ENVIRONMENTAL SERVICES LTD

**Equipment Type:** Multifunctional Meter  
**Brand Name/ Model No.:** YSI Professional Plus  
**Serial No./ Equipment No.:** 17F100236  
**Date of Calibration:** 10-July-2020                      **Date of Next Calibration:** 10-October-2020

**PARAMETERS:**

Dissolved Oxygen      Method Ref: APHA (21st edition), 4500O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
2.46	2.57	+0.11
5.53	5.60	+0.07
7.49	7.44	-0.05
	<b>Tolerance Limit (mg/L)</b>	<b>±0.20</b>

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

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)
4.0	3.98	-0.02
7.0	7.03	+0.03
10.0	9.87	-0.13
	<b>Tolerance Limit (pH unit)</b>	<b>±0.20</b>

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

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.00	--
10	9.91	-0.9
20	20.32	+1.6
30	30.34	+1.1
	<b>Tolerance Limit (%)</b>	<b>±10.0</b>

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

Ms. Lin Wai Yu, Iris  
 Assistant Manager - Inorganic

# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK2024178  
SUB-BATCH: 0  
DATE OF ISSUE: 10-Jul-2020  
CLIENT: LAM ENVIRONMENTAL SERVICES LTD

Equipment Type: Multifunctional Meter  
Brand Name/  
Model No.: YSI Professional Plus  
Serial No./  
Equipment No.: 17F100236  
Date of Calibration: 10-July-2020

Date of Next Calibration: 10-October-2020

## 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)
9.0	8.1	-0.9
19.0	18.6	-0.4
40.0	39.7	-0.3
	Tolerance Limit (°C)	±2.0

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

Ms. Lin Wai Yu, Iris  
Assistant Manager - Inorganic



## REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT: JAMES CHU  
CLIENT: LAM ENVIRONMENTAL SERVICES LTD  
ADDRESS: 11/F., CENTRE POINT,  
181-185 GLOUCESTER ROAD,  
WAN CHAI, HONG KONG

WORK ORDER: HK2028452  
SUB-BATCH: 0  
LABORATORY: HONG KONG  
DATE RECEIVED: 31-Jul-2020  
DATE OF ISSUE: 10-Aug-2020

### 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.: 19H100656  
Date of Calibration: 10-August-2020

### 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: HK2028452  
 SUB-BATCH: 0  
 DATE OF ISSUE: 10-Aug-2020  
 CLIENT: LAM ENVIRONMENTAL SERVICES LTD

Equipment Type: Multifunctional Meter  
 Brand Name/ Model No.: YSI Professional Plus  
 Serial No./ Equipment No.: 19H100656  
 Date of Calibration: 10-August-2020      Date of Next Calibration: 10-November-2020

**PARAMETERS:**

Dissolved Oxygen      Method Ref: APHA (21st edition), 4500O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
3.86	3.89	+0.03
5.08	4.96	-0.12
7.11	7.16	+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	4.08	+0.08
7.0	7.04	+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	0.00	--
10	9.84	-1.6
20	19.85	-0.7
30	29.59	-1.4
	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  
 Manager - Inorganic

# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK2028452  
SUB-BATCH: 0  
DATE OF ISSUE: 10-Aug-2020  
CLIENT: LAM ENVIRONMENTAL SERVICES LTD

Equipment Type: Multifunctional Meter  
Brand Name/ Model No.: YSI Professional Plus  
Serial No./ Equipment No.: 19H100656  
Date of Calibration: 10-August-2020

Date of Next Calibration: 10-November-2020

## 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)
10.5	10.6	+0.1
19.5	19.8	+0.3
39.5	40.0	+0.5
	Tolerance Limit (°C)	±2.0

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

A handwritten signature in black ink, appearing to read 'Chan Siu Ming'.

Mr Chan Siu Ming, Vico  
Manager - Inorganic





REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

Information supplied by customer:

CONTACT: MR. CHAN KA CHUN                      JOB REFERENCE NO.: 22777053-G27A5402  
CLIENT: LAM ENVIRONMENTAL SERVICES  
DATE RECEIVED: 27/07/2020  
DATE OF ISSUE: 31/07/2020  
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.

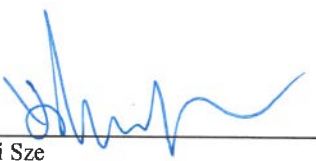
Maximum Tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of FT Laboratories Ltd will be followed.

Scope of Test:	Turbidity
Equipment Type:	Turbidimeter
Brand Name:	Xin Rui
Model No.:	WGZ-3B
Serial No.:	1807079
Equipment No.:	---
Date of Calibration:	30/07/2020

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:

31/07/2020

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Form No.: HG022-002 Rev 0 20190101

Page 1 of 2



REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

WORK ORDER: 22777053-G27A5402  
DATE OF ISSUE: 31/07/2020  
CLIENT: LAM ENVIRONMENTAL SERVICES

Equipment Type:	Turbidimeter
Brand Name:	Xin Rui
Model No.:	WGZ-3B
Serial No.:	1807079
Equipment No.:	---
Date of Calibration:	30/07/2020
Date of next Calibration:	30/10/2020
Lab I.D.:	H200217-02

Parameters:

Turbidity

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

Expected Reading (NTU)	Display Reading (NTU)	Tolerance
0	0.00	---
4	4.02	0.5%
10	9.77	-2.3%
40	40.27	0.7%
100	109.10	9.1%
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. CHAN KA CHUN      **JOB REFERENCE NO.:** 22787053-E14A5501  
**CLIENT:** LAM GEOTECHNICS LTD  
**DATE RECEIVED:** 14/05/2020  
**DATE OF ISSUE:** 29/05/2020  
**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.

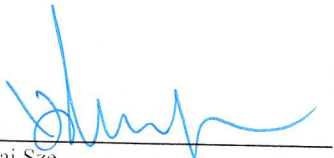
Maximum Tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of FT Laboratories Ltd will be followed.

<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>	1807069
<b>Equipment No.:</b>	---
<b>Date of Calibration:</b>	28/05/2020

**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 Size  
Senior Chemist

Issue Date:

29/05/2020



REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

WORK ORDER: 22787053-E14A5501  
DATE OF ISSUE: 29/05/2020  
CLIENT: LAM GEOTECHNICS LTD

Equipment Type:	Turbidimeter
Brand Name:	Xin Rui
Model No.:	WGZ-3B
Serial No.:	1807069
Equipment No.:	---
Date of Calibration:	28/05/2020
Date of next Calibration:	28/08/2020
Lab I.D.:	H200148-01

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	10.03	0.3%
40	39.52	-1.2%
100	99.97	0.0%
400	403	0.7%
1000	1003	0.3%
	Tolerance Limit (±)	10%

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